

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 19

APRIL, 1936

Number 4

THE RESPONSIBILITY OF THE GENERAL PRACTITIONER IN THE TUBERCULOSIS PROGRAM OF THE FUTURE*

F. M. POTTENGER, M.D.

Monrovia, California

Present Status of the Antituberculosis Program

TUBERCULOSIS studied from the mortality tables of the past quarter of a century might be considered as fast approaching a position of secondary importance in the family of infectious diseases.

From a death rate for all ages of 200 per hundred thousand population in the United States in 1900 the rate has declined to about 60 per hundred thousand today. But this fails to tell the full story, for, while the average number of deaths of all ages is in the neighborhood of sixty, the death rate for males between the ages of twenty and sixty-five runs from 100 to 165 per hundred thousand population; and of females from the age of twenty to fifty-five it drops from 140 to seventy-five per hundred thousand, to rise again to 130 per hundred thousand at the age of seventy years. This high mortality during the productive period of life still makes tuberculosis one of the greatest foes to the human race.

The situation is most gratifying if we compare only the mortality for all ages now with that of 1900; but it is distressingly unsatisfactory when we see that the death rate during the productive period of life is still so near the rate which held for the average of all ages in 1900. This enormous loss among the young adult population during the period of greatest usefulness stands as a special challenge to those who are intimately connected with the antituberculosis campaign.

The reduction in mortality which has taken place has been produced by many factors, but the cause may be summed up in the one word "knowledge." Tuberculosis took its toll throughout the ages because of the lack of knowledge of its cause, and the lack of knowledge of how to live. Its seriousness has been reduced by scientific medical discoveries which have already, in half a century, permitted an effective curative and preventive regimen to be established. This program based on our newer knowledge has made use of the services not only of the medical profession but of nurses, social workers, health boards and sanitary engineers.

We have now reached a milestone. The entire civilized world is now cognizant of the nature of tuberculosis. Probably never before in so short a period of time has so serious a problem been advanced so far on the way to its solution. The method of attack from now on must be more specifically directed to the problem of prevention if we wish to continue the progress which has been so satisfactorily started.

Curative and Preventive Measures Present Different Points of View

When it was established that tuberculosis was a curable disease our attack became at once a clinical one. A corps of specialists developed whose major efforts were put forth to cure the disease. Prevention was secondary, largely because its possibility of accomplishment was not grasped. But as time passed and knowledge of the disease became greater, cure and prevention received equal attention but from different agencies: cure from the clinicians and prevention from health authorities. Today, another change

*The John W. Bell Lecture on Tuberculosis, under the auspices of the Hennepin County Tuberculosis Association and the Hennepin County Medical Society, Minneapolis, Minnesota, December 2, 1935.

is forcing itself upon us and the entire force of tuberculosis workers has become prevention-minded and prevention has become the slogan of the antituberculosis campaign. Prevention, fortunately, demands treatment for the patient who is ill as well as measures for preventing the spread of infection.

Cure of the disease is receiving more attention than ever before, and our methods of treatment are becoming more and more effective, yet there is a sentiment, which is rapidly growing, to the effect that the rights of a patient are secondary to the rights of society, and there is a fast-growing tendency to relegate cure to second place in our program.

This point of view is that of public health as contrasted with clinical medicine. It has been arrived at, not because the rights of patients do not appeal to the tuberculosis crusaders but because of the necessity of meeting the problems of treatment as well as prevention with facilities which are inadequate. There are not now, nor are there likely to be in the near future, facilities for caring for all who suffer from tuberculosis and affording them opportunity to secure the best possible chance of cure; so the plan of treating tuberculosis with the facilities which are available and of giving aid to as many patients as possible, while increasing the efforts at preventing open cases from being sources of spreading infection, has been adopted in certain places as offering, not the ideal, but the best and most practical method under present circumstances.

Could all cases of active tuberculosis be put under treatment at the time that the disease first manifests itself, in an adequately equipped sanatorium, and be kept there until the best possible results were attained, comparatively few would fail to secure an arrestment of their disease. However, such a program would require an expansion of sanatorium facilities to several times the present bed capacity and an immediate outlay of money so great that governments could not be induced to follow the program, no matter how efficient it might seem to be, and no matter how much it would save in dollars and cents by the reduction of new infections and by restoring patients to economic usefulness. Even the amount that may be saved in lives and money by utilizing our present facilities to full advantage is almost beyond belief. The possibilities

of accomplishment under such a plan call for careful discussion that they may be understood and approached if not attained.

The chief point in such a program is not only the earliest possible diagnosis but also the earliest possible application of adequate treatment and the institution of effective measures for preventing others from becoming infected; or, if infected, from becoming ill of the disease. Such a program depends on the medical profession and principally on that part of the profession which is not actively engaged in tuberculosis work, for it is the general man whose advice is usually sought first and then the advice of the specialist follows.

An efficient antituberculosis force to carry forward the program of today would make the general practitioner the key man; so it can not be without interest to discuss the part which he must play in furthering the control of tuberculosis, and the manner in which he may do it. Tuberculosis is a preventable disease, and the family physician has an important part in its prevention; it is a curable disease and he has an important part in its cure. He must first know his part and then assume it.

In the first place he must be prepared to suspect tuberculosis when a case presents itself; and must be able to diagnose it when he suspects it. To do this he must be tuberculosis-minded. He must be expecting it the same as he expects pneumonia, syphilis, heart and kidney disease, or diseases of metabolism. He furthermore must have confidence in his ability to do the part which he assumes.

Prior to the last few decades tuberculosis was considered to be a hopeless disease, and it is no wonder that the medical profession treated it as a stepchild. But this has changed. Tuberculosis, today, is not only known to be curable, but it is known to be the most curable of the chronic diseases. In order that it may be cured, however, the diagnosis must be early and the treatment must be immediate and adequate. There is nothing magical in its diagnosis. Any physician who has graduated at a reputable medical school in recent years should be able to make a diagnosis in nearly all patients when they first seek his advice, by applying the methods which time has shown to be the most efficacious. He should not only know the relative value of the individual symptoms but he should be able to

interpret them as they manifest themselves in various combinations.

Tuberculosis Presents Different Modes of Onset

Tuberculosis may be ushered in precipitately, the patient passing from a condition of health to one of severe illness in a day's time. This is the acute exudative type which produces a widespread tuberculous pneumonia. Again, it may be months or years in developing without the patient's knowledge. Most cases lie between these extremes, the onset of activity being marked by a moderate reaction on the part of the body to a moderate dose of invading bacilli, coming from either an endogenous or exogenous source.

The beginning of activity in tuberculosis of the lung may simulate other diseases, varying with the particular syndrome which is present. The onset is often spoken of as being of distinct types, thus the "neurasthenic" type when mildly toxic; "bronchitic" type when repeated or persistent cough or colds are the principal feature; "pneumonic" type when a widespread exudative infiltration takes place because of the marked hypersensitivity of the tissues; "circulatory" type when dyspnea and unstable heart action dominate the picture; the "gastro-intestinal" type when lack of appetite with nausea and probably vomiting are present; the "hemorrhagic" type when the disease makes its presence known through the spitting of blood; and the "pleuritic" type when pleural pain or effusion are the dominant signs of bacillary activity.

It will be noted that nearly one-half of these syndromes, the "neurasthenic," the "circulatory," and the "gastro-intestinal," call attention away from the lungs, because the symptoms are either of a toxic nature or are reflexly produced in other organs. Fortunately, other reflexes will usually be present which will call attention to the lung, as the probable source.

Etiologic Classification of Symptoms of Tuberculosis

While I do not wish to be too elementary, yet I may be pardoned if I discuss the importance of a clinical history, because a carefully taken history will usually furnish the data on which a presumptive diagnosis may be based. History taking is a symptom-eliciting process. It discovers the complaints of the patient and other departures from normal.

Symptoms are disturbances in physiologic action. If one will carefully examine the symptoms which are present in active pulmonary tuberculosis, he will see that they fall etiologically into three natural groups: those caused by toxins; those of reflex origin; and those produced locally by the lesion in the lung—systemic, reflex and local. Arranged in tabular form they are as shown in the accompanying table.

If only one understands the different manner in which these three groups of symptoms are produced, it will aid him greatly in not only diagnosing tuberculosis, but in determining the degree of activity which may be present.

Let it be understood that the toxic group is in no way specific for tuberculosis. The same group of symptoms may be present in any infection such as measles, whooping cough, pneumonia, typhoid fever, or diphtheria; varying only as the causative toxins vary and as different individuals vary in their reaction to the toxic substances.

The toxic substances which cause this group of symptoms act upon cells throughout the body. They not only disturb cell activity generally but they particularly affect the two great correlating systems of body activity, the nervous system and the endocrine glands. Therefore, they are spoken of as systemic symptoms.

When symptoms of severe toxemia are present there is no difficulty in diagnosing the presence of an infection; but those of a mildly active tuberculosis not infrequently are to be differentiated from neurasthenia, psychasthenia and conditions of hypo- or hyperaction in some of the endocrine glands; the picture being that of general physiologic imbalance.

Tiredness, lack of strength and endurance, capricious appetite with fluctuations in weight, rapid or variable pulse, insomnia and general nerve instability are common to many of these states; and since hyperthyroidism and some of the conditions of nerve imbalance may disturb the heat mechanism and produce slight elevations of temperature, differentiation is sometimes difficult.

The toxic symptom which is easiest of recognition by the physician is elevation of temperature. The ones which disturb the patient most are probably fever and tiredness. One must bear in mind that the elevation of temperature is due to the body's reaction to a new invasion of

bacilli or the absorption of focal products. It may last as long as the body is called upon to react. Sometimes this is only a few days; other times it is continuous week after week and month after month. Sometimes fever and other symptoms of toxemia disappear after a few days. Then it may be difficult to make the patient realize that he is ill. He attributes the illness to a temporary cause. It is also confusing to the medical man unless he knows this peculiarity in symptomatology of a chronic infectious disease like tuberculosis. A patient may be toxic today, have elevation of temperature, complain of tiredness, aching, rapid pulse, loss of appetite and loss of a few pounds in weight, and next week may be free from all evidence of toxemia and be on the way to regaining his weight. This peculiar nature of mild tuberculous reactions must be understood by all physicians who expect to effectually deal with tuberculosis. So must the premenstrual rise in temperature, which may be present for the fourteen days preceding menstruation, or any part of that time, be held in mind. Not infrequently the normal premenstrual temperature will reach 99° and occasionally 99.6° , which may be quite confusing if other symptoms suggestive of tuberculosis are present.

Were the toxic group of symptoms the only ones on which to base a diagnosis, little, if any, suggestion of the location of the lesion would be given. Fortunately, however, symptoms of a reflex nature, at least irritation in the larynx and cough, usually accompany the toxic symptoms; and not infrequently one or more of the local group. It is not any one or two symptoms on which tuberculosis usually is suspected but some combination of representatives of the three etiological groups.

Toxic symptoms with cough and expectoration, if they persist longer than those of an acute cold, sinus infection or bronchitis, suggest tuberculosis, but the diagnosis is made only after using other methods of examination. Combinations, such as tiredness, temperature and cough; temperature, pleurisy and loss of vigor; spitting of bright blood alone or in combination with symptoms of a reflex and toxic nature, are usually suggestive of tuberculosis.

While toxic symptoms may be caused by tuberculous poisons being absorbed from any part of the body, and so have no localizing significance, irritation of the larynx, hoarseness and cough, should any one of these be present, would

at least call attention to the respiratory tract; and flushing of the face, if present, would further increase the probability of the lung being the source of the irritation which is responsible for the reflex.

Hemoptysis; pleurisy, dry or moist; and sputum are the symptoms which particularly localize the lesion in the lung, even better than the reflexes. These are the most important diagnostic symptoms of pulmonary tuberculosis. If the sputum contains bacilli, of course the diagnosis is made.

Symptoms of the toxic group, combined with one or more local symptoms, nearly always make the diagnosis of a lung or pleural lesion probable. If the local lesion be pleurisy, and it is not accompanied by pneumonia, influenza, or trauma, it is usually of a tuberculous nature.

It will now be evident that three forces only are active in disturbing the patient's physiologic equilibrium, and causing the twenty or thirty well recognized symptoms which we may meet in active tuberculosis. If the disease is mildly active, the symptoms are mild; if markedly active, they are severe.

The body cells of different individuals react differently to irritations, which accounts for different groups of symptoms being present in different patients in the presence of what seem to be similar infections. This fact must be taken into consideration in studying every patient in the presence of every disease. It is simply a way of saying that the physiologic balance of different patients differs.

This difference in physiologic balance holds for reflex symptoms as well as for those of a toxic nature. One person will be greatly perturbed by digestive and cardiac symptoms, by throat discomfort of a reflex nature and by cough, while another will show little departure from normal function in these organs.

The reflexes are caused by the inflammation in the lung irritating the endings of sensory pulmonary nerves which transmit the impulse centralward and produce reaction in motor nerves whose cell bodies lie adjacent in the central nervous system.

Group II shows the more common reflexes. I have suggested and described some forty reflexes which may be produced by inflammation in the lung. Some of these are of diagnostic import, some are not; some require therapeutic attention; others cause no serious disturbance.

TUBERCULOSIS PROGRAM OF THE FUTURE—POTTINGER

ETIOLOGIC GROUPING OF COMMON SYMPTOMS OF PULMONARY TUBERCULOSIS

GROUP I Symptoms Due to Toxemia	GROUP II Symptoms Due to Reflex Cause	GROUP III Symptoms Due to the Tuberculous Process <i>per se</i>
Malaise	Hoarseness	*Frequent and protracted colds (tuberculous bronchitis) Spitting of blood Pleurisy (tuberculosis of pleura) Sputum with or without bacilli
Lack of endurance	Tickling in larynx	
Loss of strength	Cough	
Nerve instability	Digestive disturbances which may result in loss of weight	
Loss of appetite	Circulatory disturbances	
Digestive disturbances (hypomotility and hyposecretion)	Chest and shoulder pains	
Metabolic disturbances resulting in loss of weight	Flushing of face	
Increased pulse rate	Spasm of muscles and shoulder girdle and crus and central tendon of diaphragm	
Night sweats	Diminished motion of affected side. Lagging.	
Elevation of temperature	If chronic, degeneration of apical soft tissues	
Anemia		
Leukocytic changes		

*Strictly speaking, "colds" should not be treated among the symptoms; for the "cold," as so often described, is a syndrome of acute spread of infection; a large re-inoculation with tuberculo-protein; or caseation and cavitation.

There is no subjective reflex that is always present—not even cough; nor is there anything in the reflex group which definitely indicates tuberculosis. This group, however, if one understands reflex relationships, does locate the lesion in the lung; because the reflexes, particularly those which are caused through the afferent fibers which course with the sympathetic system and efferents which supply skeletal structures, are located in definite structures, for each organ. Thus the heart reflects principally through the upper three thoracic nerves which supply the inner side of the arm and the upper portion of the chest on the left side; the stomach over the lower chest and the upper abdominal wall on the left; and the lungs in the muscles of the shoulder girdle, diaphragm, and the skin and subcutaneous tissue above the second rib anteriorly and above the spine of the scapula posteriorly. So it may be seen that these reflexes have localizing significance.

The symptoms of Group III are the most important because each symptom is caused by the tuberculous process *per se* in the tissues. The inflammation may irritate nerves and cause an increase in secretion or cause the tissues to undergo caseation and liquefaction and produce bacillus-bearing sputum; it may be situated im-

mediately under or in the pleura and cause pleural pain or an effusion; or it may involve a blood vessel and cause bleeding.

"Cold," which we classify as a symptom of tuberculosis because of the frequency with which it is present, in reality is a syndrome of immunity reaction, and while the effect is a local one it is expressed by the presence of symptoms of each group.

It will be seen that the inflammation in the lung is the direct cause of both local and reflex symptoms; and, quite frequently, symptoms of both groups are present. The symptoms of the toxic group being caused by the poisons which generate as a result of the growth and destruction of bacilli and the destruction of pulmonary tissue, while produced not by the inflammatory process but the poisons originating in it, are of added weight when present.

By analyzing symptoms according to their etiology few cases of frank tuberculosis will escape without being suspected.

When Tuberculosis is Suspected, How is the Diagnosis to be Determined?

Tuberculosis is suspected from the history which the patient gives of his illness. If tuberculosis is suspected, how will the physician pro-

ceed to make the diagnosis? There are two things that he should always do. He should have any sputum that may be present carefully examined, and he should have an x-ray taken.

I do not wish to deny him the use of other methods of examination. He should make a physical examination of every chest which is suspicious of tuberculosis; but, knowing the difficulty which one not accustomed to examining chests meets in making the diagnosis of tuberculosis by the usual procedure of physical examination, it is much better for the general man to have other measures upon which he may place his dependence.

He may rely on being able to make a correct diagnosis in fully eighty per cent of patients suffering from tuberculosis at the time when they first consult him by carefully taking a clinical history and analyzing the symptoms; by taking an x-ray; and by examining whatever secretion is coughed up. This leaves only about twenty per cent of cases in which there would be doubt, the so-called borderline cases which often require repeated examinations and careful study before the correct diagnosis is made.

A word of caution is necessary in regard to both the x-ray and the examination of sputum. Simply an examination of sputum and the taking of an x-ray is not sufficient.

The sputum must be collected properly and examined carefully in order to be of diagnostic value. In those cases in which the sputum is scant and the bacilli are rare there is great danger that the bacilli may not be found, though present. It must be remembered that the usual plan of taking a sample of the sputum coughed up and subjecting it to the ordinary Ziehl-Neelsen method of staining will prove inaccurate in many early cases.

It has been shown that about 100,000 tubercle bacilli per cubic centimeter of substances must be present in order for them to be found by this method, while the collecting of the entire amount of sputum for two or three days, and treating it by one of the concentration methods, will increase the efficiency many fold. J. E. Pottenger's dilution-flotation picric-acid method reveals bacilli when less than a thousand are expectorated in twenty-four hours. In comparing a large series of specimens showing rare bacilli, the findings with this method and guinea-pig inoculation have proved to be very close in their

relative accuracy, with the advantage for the examination because a report may be had in two hours' time.

It is important for physicians to know of this inaccuracy in the examination of sputum, otherwise, in suspicious cases they may be overawed by the laboratory's failure to find bacilli when, from the clinical history and other methods of examination, they strongly suspect tuberculosis to be present. When a definitely destructive process is present and sputum is present in fairly large quantities, the more simple method is usually sufficiently reliable, but in cases of scant sputum, too much reliance can not be placed in it.

In a suspicious case, if bacilli are found, the diagnosis is made; but if not found, even after concentration methods are used, then the patient should be kept under surveillance and re-examined at frequent intervals until the diagnosis is definite; or, what is better, a consultant, who specializes in chest diseases, should be called in to assist in making the diagnosis and to share the responsibility.

While examination of sputum may give much or no information, an x-ray, if properly taken and read by one experienced in reading plates of tuberculous chests, should furnish valuable diagnostic aid in nearly all instances. The x-ray is not absolute, however, but its value is truly great. Now and then we find symptoms of tuberculosis and rare bacilli present in the sputum when the x-ray shows nothing definite in the lung parenchyma, and we assume that the open lesion must be lost in other shadows such as those of the hilum and bronchial tree, or those of dense scar in the shadow of pleural effusion, should such be present.

In the average case, however, a good plate, a painstaking examination of sputum, and a satisfactory history will furnish sufficient evidence on which the general practitioner can make a correct diagnosis. In this day, when x-ray and clinical laboratories are practically always at his command, he should become fairly bold in assuming the responsibility that is his in the diagnosis of this disease, at least in all frank cases.

One caution, however, is necessary. He must be interested in making the diagnosis and must have confidence in his ability to do it, before assuming a responsibility which is of so great importance to the patient.

Physical Examination of Patient

Inspection, palpation, percussion and auscultation should always be utilized because they give some information even to those who do not possess great skill and they aid in securing the confidence of the patient—a thing greatly needed when dealing with a serious disease like tuberculosis. So often patients report to me that their former physician did not even listen to the chest, but made the diagnosis with the x-ray. They never feel quite satisfied without being examined physically.

In order that the general man may suspect tuberculosis, I wish to call his attention to a sign which was described by me more than twenty-five years ago which, when present, will suggest to the examiner that some chronic inflammatory lesion is, or previously has been, in the lung of the patient. I refer to the reflex degeneration of the soft tissues over the pulmonary apices.

This is often so plain that one patient notes it on another's chest. One of my patients, a few days after hearing me describe this to a visiting physician while examining her, brought her sister to me for examination, saying that she was sure she had tuberculosis because she had degeneration of the skin and subcutaneous tissues above the second rib on her left side. Examination revealed a predominantly proliferative lesion in the upper third of the left lung, and her history indicated that it had been present and active for some time. This is a sign that any physician could recognize if it were once pointed out to him.

Practice in inspection will reward any physician for his pains by giving him an important clue as to what has taken place in the past in the chest of a given tuberculous patient. This sign can also be found by palpation. The tissues which are degenerated lose their normal elastic feel and become doughy, and the subcutaneous tissue wastes and becomes thinner than the normal for that individual as determined in adjoining areas.

It is not necessary for the general practitioner to burden his mind with all the details of how this is produced, but it is of great value to him as a diagnostician to know that when he sees a wasting of the soft tissues above the second rib, anteriorly, and above the spine of the scapula, posteriorly, that this is in the area in which the

lung produces its trophic reflex, and further that the degenerative changes indicate that the disease has existed for some time; at least months. In fact, it may be healed, but if the patient is showing suspicious symptoms, it offers a localizing bit of evidence of where disease has been in the past and where it may be suspected now.

Old healed lesions may cast doubt on the value of this reflex to one who has not followed tuberculosis carefully, for it is not uncommon for a lesion, particularly a predominantly exudative lesion, to be present sufficiently long to cause degeneration and then to heal so completely that an x-ray may fail to give any idea of its extent when it was in its acute state. However, regardless of this confusing fact, should general medical men recognize this localized degeneration, it would be to them a sign of inestimable value.

The motor reflexes in the muscles of the shoulder girdle, too, are of great diagnostic value but more difficult to determine.

The General Practitioner's Part in Treatment

On a diagnosis of active tuberculosis being made, it is important for the practitioner to know what to do in order to carry out his obligation to the patient. A situation arises here which is just as serious as that met when an appendicitis, a diabetes, or a heart lesion has been discovered. The physician must be certain in his instructions. The right course leads to an improvement or cure, while a wrong one permits the disease to extend and injure the patient's future usefulness or even destroy his life.

Can the general practitioner successfully treat a patient suffering from active tuberculosis, and is the patient justified in depending upon him in so serious a disease? With the lack of interest which the general profession has taken in tuberculosis in times past, and even in the present, this question can be answered in the great majority of instances with an unqualified "No." But the past and present should not control the future. Every practitioner of medicine who has graduated in recent years should be familiar with the methods of diagnosis and the measures used in treating tuberculosis. If he assumes the responsibility of protecting the health and lives of the people who consult him, he should make no exception in tuberculosis. He should familiarize

himself with the facts which he must know about tuberculosis, and take the same interest in it that he takes in other diseases.

It is necessary to fully appreciate the fact that when a diagnosis of early active tuberculosis is made the patient's chances of recovery are good if intelligently treated, but are very doubtful if wrongly treated. The prognosis in early active tuberculosis is nearly as good as in acute appendicitis, if both patients receive the benefits of well established treatment. If neglected, it is as apt to extend and bring about as serious a situation as acute appendicitis. The difference is that months and probably years intervene between the first symptoms and serious illness and death in tuberculosis, while hours or days only intervene in appendicitis. The lapse of time does not change cause and effect, but clouds the relationship.

A patient with an acutely active tuberculosis can not go about his business, even though his temperature is normal, without jeopardizing his chances for life. This must be clearly understood by any one who would treat tuberculosis.

Every physician who accepts the responsibility of treating tuberculosis should understand the importance of rest, and be familiar with the technic of its application. Even though he may intend to refer his patient to a specialist for care, as soon as a diagnosis has been made he should put the patient on bed rest, using his judgment only in deciding whether or not the patient is to have bathroom privileges. Unless the patient is very ill I would not deny this.

The patient should be given a nourishing diet, kept in a well ventilated room, given all the optimism that present methods of treatment warrant, and be protected from long, tiresome visits and disastrous advice of well-intending friends. He should be seen frequently by the physician in order to be sure that the program as laid down is being carefully followed, to change it as conditions arise which call for change, and further for the purpose of keeping constantly before the patient the fact of his curability. It is a time when the philosophy and psychology such as was possessed by the old "family physician" comes into play.

If the physician has fitted himself to treat tuberculosis, and conditions warrant his doing it in a given instance, he should then establish a regimen which is to be followed religiously—not

for a week or a month—but for months. If he has not prepared himself to do so, however, he should refer the case at once to some one who is qualified to apply modern methods of treatment to best advantage. Time is the essence of the contract. Delay is costly in time, money, future efficiency and often in life.

The General Practitioner's Part in Prevention

The family physician also must assume the responsibility of preventing the spread of infection and the developing of the disease. As soon as open tuberculosis is discovered, the patient must be instructed how to prevent infection of others. He must be told of the necessity of destroying all sputum or other discharges; he must be instructed in personal hygiene, the care of the mouth, the importance of avoiding soiling his hands, clothing and bedding with infectious material; the part that sunshine and open air have in reducing infection, and his duty towards those who must care for him.

The physician owes a debt to those who have or must continue to live in the same house. They must be instructed how to avoid infection. Children should be kept from the room and, better still, should be removed from the house. They are most susceptible to infection. Practically every child who lives in the same house with an open case of tuberculosis for any length of time, becomes infected; therefore, if possible, removal should be made as soon as a diagnosis is made.

The family physician can do more than this. He should find out whether or not the other members of the family are already infected. This can be done by the simple tuberculin test. This is a test that every physician should know how to give. There is nothing difficult in its administration or its reading. A sharp needle and the preparation of tuberculin to be used, and an understanding of the dosage and technic of injecting it between the layers of the skin is all that is necessary in its administration, and then seeing the patient twenty-four, forty-eight and probably seventy-two hours afterwards, to see whether an induration indicating positive reaction has appeared and to study the course which it follows, are the requirements for completing the test.

Should a positive reaction be found, then it is known that infection has already taken place.

CHRONIC MYOCARDIAL DISEASE—LLOYD

The source of the infection, however, is not indicated; for we are often surprised to find an infection in children where there has been no immediate contact. Therefore, it seems to me to be bad psychology and bordering on cruelty to tell a mother or father, or a sister or brother, that he or she has infected other members of the family. It is better to tell them that it might be so, but leave the matter uncertain so as to give the patient the benefit of the uncertainty. Such escape is due any conscientious patient who may have unknowingly exposed other members of the family. However, in case the patient is wilful and unwilling to take precautions, then the physician might be less considerate.

The physician must be able to explain to the anxious relatives the meaning of primary infection. While primary infections are common and probably present in nearly half of our city children, the number that will break down with active tuberculosis is very few. Infection and disease are two very different conditions. The knowledge of the presence of infection may be used in the interest of reactors to prevent them from becoming actively diseased.

Knowing of the presence of a primary infection, it is the duty of the physician to see that the infected individual maintains a high standard of health until the lesion is healed. At the first indication of a failure to maintain normal health, the possibility of an extension of the known tuberculous infection should be thought of, and the individual should be subjected to re-examination, and to treatment if active disease is found.

Conditions which should serve as danger signals are a stoppage of development, tiredness, nervousness, lack of desire to play, and lack of appetite, in an infected child; while in an adult, it would be some of the syndromes which have previously been mentioned as indicating early tuberculous infection. A chest plate of such patients should be immediately taken, and, if a parenchymal lesion is found, treatment should be at once instituted. This condition, contrary to the usual primary infection, must not be considered simple and inconsequential, for it is apt to be the beginning of a serious disease. Treatment at this time may be compared to operating on appendicitis when the first symptoms develop. It save the patient's life and in case of tuberculosis spares him a long-drawn-out and costly illness.

As we face the future we visualize the general practitioner taking a much more intimate part in the tuberculosis program than heretofore. I have endeavored to point out what this part may be, and to assure him that a very dignified position awaits him in which he may become the chief diagnostician; the one who decides who shall treat the patient and where the treatment is to be carried out; the one who must apply preventive measures in case of open tuberculosis, to check the spread of infection, and the one who should apply the tuberculin tests to locate infection, and to prescribe the course to be followed in case it is present. A whole-hearted cooperation on his part should insure a continuous decline in the morbidity and mortality from this disease.

CHRONIC MYOCARDIAL DISEASE*

H. J. LLOYD, M.D.

Mankato, Minnesota

THE subject of chronic myocardial disease was selected because of its increasing importance to the general practitioner, as well as to the cardiologist. The disease is definitely on the increase, and now heads the list of the diseases causing death and disability in middle age and advanced life. About 60 per cent of the cardiac diseases that the general practitioner sees is of

this type. The term is now used by the leading clinicians to include or displace such terms as "chronic myocarditis," "chronic cardiac fibrositis," "chronic myocardial degeneration," and "chronic hypertensive heart disease." This term includes all those forms of cardiac disease that show failure of the myocardium to perform its function properly. Valvular disease, syphilis, thyrotoxicosis, and congenital heart defects, of course, are not included.

*Read before the annual meeting of the Southern Minnesota Medical Association, Austin, Minnesota, August 26, 1935.

The etiology of this disease is still somewhat obscure. Infections of early life and the onset of arterial hypertension in early middle life undoubtedly form important etiological factors. The social conditions under which business and professional men of today live are undoubtedly also contributory factors. The early beginnings of these cardiac changes are seldom recognized. We are familiar only with the later manifestations, and are called on to deal chiefly with corrective measures after the damage to the heart has fully developed.

The symptoms of chronic myocardial disease are varied, but the constant manifestations in all forms are hypertrophy and dilatation of the heart, with consequent interference with many of the normal functions of the heart. Christian calls attention to the fact that a narrowing of the lumen of the retinal arteries is a very constant concomitant finding. Coincident states, either as causes or sequelæ, are coronary disease, advancing arteriosclerosis, engorgement of the liver, kidneys, and lungs, and a disturbance of the proper functioning of the entire circulatory system. The subjective symptoms begin insidiously with easy fatigability, and dyspnea after exertion which does not clear up normally after a period of rest. Cough, cyanosis and orthopnea with symptoms of decompensation are later manifestations.

It is useless for me to attempt to summarize the pathological findings in this disease. Investigators such as Christian and Cabot have been greatly puzzled in their postmortem findings in a great many of these cases. Many, of course, show changes in the coronary arteries, fibrous degeneration of the heart muscles in certain areas affected by coronary occlusion, and sometimes a form of fatty degeneration, or cloudy swelling of the muscle cells. They find, however, that a great many of these hearts show nothing but extensive or massive hypertrophy

and dilatation with no evidence of inflammation or degeneration in any part of the structure. It is evident that the unknown factors causing these changes have also contributed to a generalized interference with the entire vascular system. The development of massive tissue in the heart evidently interferes with its physiological function as a pump. The progressive deterioration of the circulatory system brings invalidism and finally sudden or gradual exodus.

The problem of treatment is too well outlined in the voluminous medical literature on the subject, for us to consider in this brief paper today. Digitalis for decompensation, salyrgan or similar mercurials for edema, theobromin derivatives for arteriolospasm, and morphine for orthopnea—all are among the best recognized measures for relief. Now comes enthusiasm for a new procedure—the total ablation of the thyroid. We hope that this is not simply another over-emphasized innovation. Reports are quite encouraging. We grasp at anything that promises relief for these suffering invalids, and we are often deeply disappointed with their inefficacy.

The problem of the future in the prophylaxis or cure of this disease ranks in importance with that of cancer and tuberculosis. We have not given enough attention to its prevention. The value of periodic health examinations cannot be too strongly emphasized. Better instruction for the medical student and the general practitioner in the use of cardiac function tests, and in the recognition of the early signs of myocardial failure must be stressed. Public health organizations must stress to their public the essentials of proper living conditions, and strive to prevent this disease that disables individuals in the prime of life. And it is usually the individual whose experience and mature judgment are of value to society that is most often afflicted by this disabling disease.

HETEROPHILE PNEUMOCOCCIC SERUM IN THE THERAPY OF LOBAR PNEUMONIA*

JOHN F. NOBLE, M.D., and FRANCIS E. KIBLER, M.D.

Saint Paul

SINCE Forssman's⁹ work on heterophile antigen antibody reactions in 1911, the subject has been extensively studied. For many years, however, the interest of immunologists was largely academic, and the phenomenon seemed to have little bearing on the immune processes involved in protection against disease. Research was limited for the most part to the investigation of various animal tissues and bacterial species for the presence or absence of the heterophile antigen. The apparently bizarre distribution of this substance in nature is a fascinating study and still remains an enigma. For a general review of the subject of heterophile antigen antibody reactions, the reader is referred to the recent monograph by Davidsohn⁸ and the excellent discussions by Bull² and Topley and Wilson.¹⁰

Bailey and Shorb¹ were perhaps the first investigators to point to the possibility that heterophile antibodies may have some biological significance in relation to bacterial infections. They studied a large number of cultures of different types of pneumococci and found that rabbits injected with, or fed these organisms, developed a potent antishoop hemolysin in their sera. This hemolysin seemed identical with that stimulated in rabbits injected with boiled sheep corpuscles and was absorbed by homologous or heterologous boiled pneumococci, and with boiled sheep corpuscles. The hemolytic rabbit serum also showed a characteristic toxicity for the guinea pig. They further showed that rabbits immunized with sheep corpuscles were relatively resistant to intravenous injections of Type I pneumococcus and suggested the possibility that the variable amounts of antishoop hemolysin found in normal human serum¹ may be due to the fact that many individuals carry the pneumococcus in their mouths and upper respiratory tracts. All of the above findings seemed to be supported by the fact that these authors showed a definite increase over normal in the heterophile antibody content of human serum

in clinical cases of lobar pneumonia both during and after the infection. The data from which this conclusion is drawn are not detailed by these authors. Recently Finland, Rueggsegger, and Felton⁷ have studied a series of cases of lobar pneumonia for the antishoop hemolysin in the serum during and after the illness. They noted, among other things, that high heterophile antibody titers did not always determine recovery, also that persons treated with certain preparations of pneumococcic antigens did not develop heterophile antibody titers above normal. As a result of their studies, they concluded that heterophile antibody was likely not a factor in the immunology of lobar pneumonia, and that the pneumococcus, although admittedly a strong heterophile antigen in rabbits, probably did not act as such in humans. It was also suggested that only avirulent pneumococci contain heterophile antigen.

From the point of view that heterophile antibody may be one of the factors in recovery from human pneumonia, however, this paper of Finland et al⁷: (a) does not show that heterophile antibody is never a factor, inasmuch as it would not be the expectation that it is the only factor; (b) does not show that intact pneumococcal vaccine (instead of certain antigen preparations) is not a strong heterophile antigen in humans, and (c) does appear to show that of the fatal cases two-thirds have low and one-third have high heterophile antibody titers (i.e., 0.40 units and 80-1280 units), while of the recovered nonserum-treated cases one-third have low and two-thirds have high heterophile antibody titers. Their "favorable pneumonia cases" do and should correspond to normal immunes.

Also, it is well known that heterophile antigenicity and virulence of the pneumococcus are not related directly or inversely (Bailey and Shorb¹ and Eisler and Howard⁶).

Finland, Rueggsegger, and Felton⁸ object to the use of the serum clinically for the reason cited above and because of the fact that only animal

*From the Ancker Hospital, Saint Paul, Minnesota.

LOBAR PNEUMONIA—NOBLE AND KIBLER

CHART I. SERUM CASES

Case No.	Age	Sex	Type	Leuko- cyte Count	Blood Culture	X-Ray Involve- ment	Reaction to Serum			Clinical Improvement	Amount of Serum Given	Dose Interval	Complications	Results	Comments
							Temp.	Chill	Serum Sickness						
1	37	M	N.T.	25,060		R.L.	.8°	None	Urticaria	Marked	60,000 U	4 Hrs.	Effusion	Recovery Crisis	Less toxic. Pulse, respirations and color improved. Effusion disappeared spontaneously.
2	26	M	N.T.	14,500	Neg.	R.L., R.M., L.U.	0°	None	None	Moderate	30,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Delirium stopped.
3	30	F	N.T.	7,760		R.L., R.M., R.U.	0°	None	None	None	60,000 U After 48 hr. interval, 40,000 U	6 Hrs.	None	Died	Patient failed to respond to anything. Alternately delirious and stuporous.
4	16	M	N.S.	15,150	Neg.	R.L.	.5°	None	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Pulse, color and respirations much improved.
5	14	F	N.T.	32,600		L.L.	.5°	+	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Pulse and respirations improved. Desensitized to serum.
6	21	F	N.S.	26,100		R.L.	1°	None	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Dyspnea, color and pulse improved. Less restless.
7	15	F	N.T.	22,800		R.U.	1°	None	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Respirations and pulse improved. Epistaxis three times.
8	34	M	N.T.	14,400		R.U.	1.3°	+	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Pulse and respirations much improved.
9	45	M	I	19,900	Neg.	R.L. with effusion	0°	None	None	Slight Temporary	60,000 U	4 Hrs.	Empyema	Died	Pulse and general appearance improved for twenty-four hours.
10	19	M	IV	19,060	Neg.	R.L., R.M.	.5°	None	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Respirations, pulse and color much improved.
11	36	F	I	39,100	Neg.	R.U.	0°	None	Urticaria	Moderate	60,000 U	4 Hrs.	Effusion	Recovery Lysis	Less toxic. Pulse and respirations improved. Effusion cleared spontaneously.
12	24	M	I	19,060	Neg.	R.L.	0°	None	Urticaria	Slight	60,000 U	4 Hrs.	Effusion	Recovery Lysis	Pulse slower and stronger. Became irritable. Effusion cleared spontaneously.
13	26	M	IV	20,660	Neg.	R.L.	.5°	None	None	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Dyspnea, pulse and color improved.
14	37	M	IV	11,300	Neg.	R.L. with effusion	2°	+++	None	Moderate	40,000 U	4 Hrs.	Empyema	Recovery Lysis	Less toxic. Delirium, pulse and respirations improved. Three rib resections necessary for localized empyema.

Less toxic. Pulse and color improved. Patient is a chronic alcoholic, acutely so on admission. Mild delirium developed. Has

Recovery
Lysis

None

4 Hrs.

60,000 U

Moderate

Urticaria

None

.5°

R.U.

Neg.

7,060

IV

M

30

15

LOBAR PNEUMONIA—NOBLE AND KIBLER

16	30	M	IV	7,080	Neg.	R.U.	-5°	None	Urticaria	Moderate	40,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Pulse and color im- proved. Patient is a chronic al- coholic, acutely so on admission. Mild delirium developed. Has tertiary lues.
16	22	F	N.T.	15,900	Neg.	R.U.	.5°	+	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Pulse, color and res- pirations greatly improved.
17	33	F	N.T.	23,450		R.L. with effusion	0°	None	Urticaria	Moderate	60,000 U	4 Hrs.	None	Recovery	Moderate improvement. Respira- tions improved.
18	30	M	I	18,650	Neg.	R.U.	1°	++	Urticaria	Moderate	40,000 U	6 Hrs.	Empyema	Recovery Lysis	Delirium lessened. Pulse and color improved.
19	25	M	N.T.	16,400	Neg.	R.L.	1.5°	+	None	Moderate	40,000 U	4 Hrs.	None	Recovery Crisis	Much less toxic. Pulse greatly im- proved. Less dyspnea. Although temperature rose with each in- jection, pulse stayed down after first dose.
20	40	M	N.T.	13,250	Neg.	R.U.	0°	None	Urticaria	Marked	60,000 U	4 Hrs.	Effusion	Recovery	Less toxic. Pulse and respirations improved. Effusion cleared spontaneously.
21	34	F	N.S.	20,200	Neg.	R.M., L.L.	0°	None	None	None	10,000 U		Effusion	Died	Serum not repeated because of long time interval between onset and hospitalization.
22	37	M	I	6,900	Pneumo- cocci	R.U., R.M., R.L.	0°	None	None	Moderate	60,000 U	4 Hrs.	None	Died	Pulse and dyspnea improved for eight hours after first dose of serum. Patient irrational at time of admission.
23	26	M	II	17,700	Neg.	L.L.	1°	None	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Pulse and respirations improved immediately. Less toxic.
24	37	F	I	16,150 24,250	Pneumo- cocci	R.U., R.M., R.L., L.L. Effusion, right	.5°	None	None	Moderate	60,000 U	4 Hrs.	Empyema	Recovery Crisis	Taken out of oxygen tent. Dyspnea and color and pulse improved.
25	27	F	N.T.	16,250	Neg.	R.L., R.U.	1°	+	Urticaria	Slight	60,000 U	4 Hrs.	None	Recovery Crisis	Required oxygen tent. Color im- proved however, and pulse slow- er and stronger.
26	50	M	N.S.	4,750	Contami- nated	R.L., R.U., L.L.	0°	None	None	None	80,000 U	4 Hrs.	None	Died	Pulse improved. Patient admitted with delirium tremens. Old al- coholic.
27	17	M	IV	13,800	Neg.	R.U.	.5°	None	Urticaria	Marked	40,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Dyspnea and color and pulse improved. Patient bright- er. Serum sickness on the seventh day.

L.L. = Left Lower Lobe of Lung.
 L.U. = Left Upper Lobe of Lung.
 R.L. = Right Lower Lobe of Lung.
 R.M. = Right Middle Lobe of Lung.
 R.U. = Right Upper Lobe of Lung.
 N.S. = No Sputum.
 N.T. = No Typing Done.

CHART I. SERUM CASES—Continued

Case No.	Age	Sex	Type	Leuko- cyte Count	Blood Culture	X-Ray Involvement	Reaction to Serum			Clinical Improvement	Amount of Serum Given	Dose Interval	Complications	Results	Comments
							Temp.	Chill	Serum Sickness						
28	48	M	IV	17,000 21,860	Pneumo- cocci	R.U.	1.8°	None	None	Moderate	40,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Pulse and delirium improved. Has undulant fever.
29	69	F	IV	9,250 18,260	Neg.	R.L., L.U.	0°	None	None	Moderate	40,000 U	4 Hrs.	Consolidation	Died	Pulse and respiration improved. Original involvement cleared in three days. New involvement on fifth day. Hypertensive heart disease with failure.
30	48	M	IV	11,160	Neg.	L.L.	0°	+	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery	Less toxic. Cyanosis and dyspnea improved. Pulse slower and stronger.
31	37	F	I	14,700	Neg.	L.L.	0°	+	Urticaria	Marked	60,000 U	4 Hrs.	Effusion	Recovery Pseudocrisis	Less toxic. Pulse and color improved. Respirations less labored. Effusion developed on seventh day. Cleared spontaneously.
32	36	M	I		Pneumo- cocci	L.L., L.U.	1°	++	None	None	60,000 U	4 1/2 Hrs.		Died	Chronic alcoholic. Delirious on admission. Fibrillation present on admission.
33	58	F	N.T.	16,800 36,600	Neg.	L.L. with effusion	1°	None	None	Very slight	40,000 U	4 Hrs.	Empyema	Died	Pulse and temperature improved for twelve hours. Patient involuntary and delirious on admission. Fluid in left chest on admission.
34	41	F	IV	9,040		R.U., R.L., R.M.	0°	None	None	None	40,000 U	4 Hrs.	None	Died	Patient appeared brighter twelve hours later. Pulse improved. Cyanosis and dyspnea same.
35	22	F	IV	19,940 19,940		R.L.	0°	+	Urticaria Arthritis	Marked	40,000 U	4 Hrs.	None	Recovery Crisis	Marked improvement in respiration, pulse and color. Serum sickness on the eighth day.
36	46	F	IV	16,160 6,840	Neg.	Bilateral effusion	1.8°	+++	None	Moderate	40,000 U	4 Hrs.	None	Recovery	Less toxic. Dyspnea and color improved. Developed emesis following chill. Moderately severe cardiac decompensation and auricular fibrillation on admission.
37	24	M	IV	13,000 26,950	Neg.	L.L.	1°	++	None	Slight	90,000 U	4 Hrs.	None	Recovery Lysis	Delirium following first dose. Pulse and color much improved.
38	41	F	I	27,000	Pneumo- cocci	R.L., R.M., R.U.	1°	None	Urticaria	Moderate	80,000 U	4 Hrs.	Empyema	Recovery Lysis	Slightly less toxic. Color, pulse and respirations improved. Rib resection.

LOBAR PNEUMONIA—NOBLE AND KIBLER

39	F	20	IV	15,600	Neg.	L.L., R.M.	0°	None	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Markedly less toxic. Pulse, color and respirations improved.
40	F	51	IV	23,240	Neg.	L.L.	1°	+++	Urticaria	Marked	60,000 U	4 Hrs.	None	Recovery Lysis	Less toxic. Pulse, dyspnea and color improved. Sensitive to skin test. Has latent lues.
41	M	53	IV	11,200	Neg.	L.U., L.L.	3°	None	None	Marked	40,000 U	6 Hrs.	None	Recovery Lysis	Less toxic. Decrease in dyspnea and pulse rate.
42	F	14	N.S.	13,780	Neg.	R.U.	6°	++	Urticaria	Marked	40,000 U	6 Hrs.	None	Recovery Crisis	Never any sputum after admission. Less toxic. Dyspnea and cyanosis gone after first dose.
43	F	26	IV	5,500	Neg.	L.L.	2°	++	Urticaria	Marked	30,000 U	4 Hrs.	None	Recovery Crisis	Moderately severe diabetic. Decrease in toxicity, dyspnea and cyanosis.
44	M	37	I	13,300	Neg.	R.U., R.M., R.L.	2°	++	Urticaria	Moderate	60,000 U	18 Hrs.	Empyema	Recovery Lysis	Alcoholic with delirium tremens. Pulse and respirations improved. Delirium gone.
45	M	35	IV	25,930 14,000	Neg.	R.U.	1°	None	None	Marked	30,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Dyspnea and cyanosis absent. Pulse and respirations markedly improved.
46	F	49	N.S.	7,550	Neg.	R.L.	2°	+++	Urticaria	Marked	20,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Comfortable, and respirations quiet. Pulse normal.
47	M	27	IV	8,900	Neg.	R.L., R.U.	1°	None	Urticaria	Slight	60,000 U	5 Hrs.	None	Recovery Crisis	Slightly less toxic. Cyanosis absent. Dyspnea not affected. Spread to right upper lobe.
48	F	222	I	9,850 19,780		R.L., R.M., L.L.	1°	None	Urticaria	Marked	40,000 U	4 Hrs.	Effusion	Recovery Crisis	Less toxic. No dyspnea or cyanosis. Pulse and respirations normal. Empyema did not develop.
49	F	60	N.T.	9,250		L.L.	1.5°	None	None	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Less toxic. Respirations and pulse markedly improved. Pneumonia complicated hypertensive heart disease with decompensation.
50	M	33	N.T.	21,200	Neg.	R.L., R.U., L.U.	0.5°	+	None	Marked	60,000 U	4 Hrs.	None	Recovery Crisis	Markedly less toxic. Pulse and respirations improved. Cyanosis and dyspnea gone.

L.L. = Left Lower Lobe of Lung.
 L.U. = Left Upper Lobe of Lung.
 R.L. = Right Lower Lobe of Lung.
 R.M. = Right Middle Lobe of Lung.
 R.U. = Right Upper Lobe of Lung.
 N.S. = No Sputum.
 N.T. = No Typing Done.

experiments using mice, rabbits, et cetera, seem to point to its value. It appears there is little choice in the early testing of antiserum other than to use animals, and moreover mice only are used in assaying the potency of ordinary horse antipneumococcic serum. Also, this objection seems hardly a valid reason against its use as an additional therapeutic agent in the serum therapy of pneumonia, since, as the authors themselves point out, only by clinical trial can its value be determined.

Powell, Jamieson, Bailey, and Hyde¹⁴ in 1933 studied the suitability of rabbits in determining the curative value of antipneumococcus serum and advocated the use of rabbits in place of the usual mouse protection tests in antipneumococcic serum. In these experiments, support was given to the value of heterophile antibody in the treatment of pneumococcic infections, the authors suggesting a combination of the usual protective antibodies developed in the horse, the heterophile antibody and the antibody which neutralizes skin toxic substances. This latter antibody was described by Jamieson and Powell¹² in 1930. Powell et al¹⁴ felt that a combination of these three elements would "more nearly simulate convalescent serum antibodies than would the usual horse antiserum," and that "any heterophile antigen in the horse serum would be neutralized and not need to be dealt with by the patient already reacting to heterophile antigen in the infecting pneumococci."

With these experimental data as a basis, an anti-pneumococcus serum was developed on a commercial scale.

Briefly, the method of preparation as outlined by the manufacturer is as follows: The new heterophile antipneumococcus serum contains three elements. First, the usual protective antibodies are developed in the horse and these antibodies are concentrated by the method first introduced by Izar and Caruso.^{10,11} Type I and II pneumococci are used and the finished serum has the same potency and the same number of units usually contained in serum of this type. The second element is an antitoxic substance produced in the horse by the injection of filtrates of broth cultures of Type I, II, and III, and Group IV pneumococci. This substance is therefore not type specific but according to Jamieson and Powell¹⁴ its action reduces toxic symptoms. The third element is the heterophile antibody. This is

developed in rabbits by the injection of a heterophile antigen. One objection to the usual horse antipneumococcic serum is the fact that the horse serum contains heterophile antigen and therefore its use adds an additional amount of heterophile antigen to the pneumonia patient who is already amply supplied with this material from the presence of the pneumococcus. For this reason, the native heterophile antigen is extracted from the horse antipneumococcic serum by the addition of a small amount of heterophile antibody rabbit serum. With the addition of the heterophile rabbit serum, the heterophile antigen is precipitated and filtered out of the horse immune serum. The horse serum is then reinforced by the addition of a certain number of heterophile antibody units of immune heterophile rabbit serum. This combination is then rational at least in Types I and II pneumococci infections, for it supplies the usual animal protective antibodies plus the heterophile and antitoxic elements. In Type III pneumonia, the ordinary antipneumococcic serum is, of course, of no value. In Group IV pneumonias, a whole series of separate type horse antiserum are being studied. Whatever efficacy therefore the new serum may have in pneumococcic pneumonia other than Types I and II, is based almost entirely on its non-type specific antitoxin and the heterophile antibody.

The series of 146 cases of lobar pneumonia reported below were treated at the Ancker Hospital between November 1, 1934, and June 1, 1935. These cases were treated on the Medical Services of Doctors Alfred Hoff, A. R. Hall, E. V. Goltz, and Harry Oerting, and their associates, and it is with their kind permission that this report is made. This series represents all of the cases of lobar pneumonia admitted to the hospital during this period. Of these, fifty were treated with the combined serum just described, while the other ninety-six cases received nothing but nonspecific therapy. The control series is far from perfect for it was impractical to attempt to treat every other case with serum. During the first two months of the period, serum was available on only one service and later some of the clinicians felt that the serum was not sufficiently advanced beyond the experimental stage to warrant its use. There was, however, no conscious selection of the serum cases on the basis of the severity of the disease. In some instances, age

LOBAR PNEUMONIA—NOBLE AND KIBLER

CHART II
SERUM CASES NONSERUM CASES

Age	Recovered	Died	Recovered	Died
14-19	6		5	2
20-29	15		10	2
30-39	10	4	14	3
40-49	7	2	17	5
50-59	3	2	5	9
60-69	1	1	5	9
70-79			2	5
80-99				3

or duration of the illness before hospitalization may have appeared as a contraindication for the use of serum. Many of the serum-treated cases, however, were far from ideal in this respect as will be seen in Chart I.

Of the fifty cases treated with serum, nine died, making a mortality rate of 18 per cent. In the group of ninety-six cases treated nonspecifically, thirty-eight died, making a mortality rate of 39.5 per cent. This appears to be a significant difference; however, the number of treated cases is small, and the control series is not beyond some criticism. The death rate in the non-serum cases is high, which is not unusual in certain epidemics of lobar pneumonia among the class of patients treated in a charity institution such as the Ancker Hospital.

Chart II shows the cases treated by serum and the nonspecifically treated cases arranged in age groups. Fourteen years was selected as the lower age limit. All cases younger than this were treated on the pediatric service. It will be noted that in the first two age groups there were no deaths in the serum-treated cases, while in a somewhat smaller number of nonserum cases of the same age there were four deaths. Only two cases over sixty years of age were treated with serum, while there were twenty-four cases over sixty years not treated by serum. This latter group showed an extreme mortality of 70.8 per cent. This undoubtedly accounts, to some extent, for the difference in total mortality. Excluding all cases over sixty years of age in each group, however, there is still a considerable difference in mortality. The mortality rate in the serum treated cases under sixty years of age was 16.7

CHART III. SERUM CASES

Type	Recovered	Died
I	8	3
II	1	0
III	0	0
IV	16	2

CHART IV. NONSERUM CASES

Type	Recovered	Died
I	7	3
II	1	1
III	1	0
IV	8	4

per cent, while in the control group it was 29.2 per cent. The authors are of the opinion that age alone is no contraindication to serum therapy and, perhaps, the mortality in this older group might be reduced by the use of serum.

Because of the fact that in the cases over sixty years of age serum was used in only two instances, the two groups are comparable only if those cases over sixty years of age are omitted. Therefore, in the following statistical study of the mortality rate in the serum-treated and control groups, only those cases under sixty years of age were used. According to the Chi square test for the four-fold table shown in Chart X, this difference in mortality would occur by chance only twelve times in one hundred. The Chi square for this four-fold table was computed as follows: $\text{Chi}^2 = (ad - bc)^2$ which gave a Chi square of 1.56 for which the probability integral was .12.

In Charts III and IV, the cases are analyzed as to death rate in the four types of pneumococcal infection. Unfortunately, the data here are incomplete. Only thirty of the cases treated with serum were typed. In five additional cases in this group, no sputum was available for typing (Chart I). Two of these five died shortly after admission. In the other three, no sputum was raised after serum therapy was instituted. In the nonspecifically treated group, twenty-five cases were typed. Most of the pneumonias in each group were Types I and IV. The number of cases is too small for the deduction of definite

LOBAR PNEUMONIA—NOBLE AND KIBLER

CHART V. BLOOD CULTURES IN SERUM CASES

Type	Recovered	Died
I	1	3
II	0	0
III	0	0
IV	1	0
No growth	30	5

CHART VI. BLOOD CULTURES IN NONSERUM CASES

Type	Recovered	Died
I	0	0
II	0	1
III	0	0
IV	0	0
No growth	13	6

CHART VII. TIME RELATIONSHIP BETWEEN ONSET AND SERUM THERAPY

Hours	Recovered	Died
12-24	4	0
24-48	12	1
48-72	11	2
72-96	6	2
96-120	4	1
120-144	3	0
144-148+	1	2
Time unknown	0	1

conclusions, but it is interesting to note that in the Type IV pneumonias, the mortality rate is considerably lower in the serum-treated cases. It will be remembered that in this type of infection, only the heterophile antibody and the antitoxin in such antiserum are active.

The blood culture findings are shown in Charts V and VI. Only single cultures were taken on each case and only a small percentage of the nonserum cases had blood cultures done. Three or four cases of Type I pneumonia with positive blood cultures died.

Chart VII shows the time relationship between the onset of the pneumonia and the first dose of

CHART VIII. TIME OF ONSET TO HOSPITALIZATION
SERUM CASES

Days	Recovered	Died
1	13	0
2	11	3
3	10	3
4	4	0
5	1	1
6	2	1
Not known	0	1

serum. It is interesting to note that in the seventeen cases given serum within forty-eight hours of the onset of symptoms, there were only three deaths, or a mortality of 5.8 per cent.

Analysis of the complications in each group shows no appreciable difference. In the serum-treated cases, the only serious complication was empyema. This occurred in seven cases or 14 per cent. In the nonserum cases, empyema occurred as a complication in only eleven cases or 11.4 per cent. Five other cases in this group had such complications as pericarditis, lung abscess, or otitis media and mastoiditis, bringing the total complications to 16.6 per cent.

The morbid period in days shows no appreciable difference when the fatal cases are excluded. The average hospital days for the serum-treated cases was 21.9 and for the control group 21.6.

In Charts VIII and IX, the cases are analyzed as to the relationship of the time of onset to the time of hospitalization. It will be seen that in the serum-treated cases, hospitalized within 48 hours of the onset, the mortality was 10 per cent while in the similar nonserum group, the mortality was 34.3 per cent.

In Chart I, the reactions to the serum are noted in each case. The average rise in temperature in degrees following the injection of the serum is recorded. In only one instance, Case 42, was this alarming. The average temperature rise in this case was 6° F. and on one occasion the temperature was 108° F. and on another occasion 107.6° F. At no time, however, did the patient show any signs of collapse and the temperature was out of proportion to the degree of toxicity exhibited by the patient. For the most part, the temperature reactions to the serum

LOBAR PNEUMONIA—NOBLE AND KIBLER

CHART IX. TIME OF ONSET TO HOSPITALIZATION
NONSERUM CASES

Days	Recovered	Died
1	11	4
2	10	7
3	14	9
4	5	8
5	3	5
6	4	1
7	4	2
8	1	0
9	0	0
10	1	2
Not known	2	0
In hospital	2	1

were of little consequence. Nineteen of the fifty patients had chills of varying degrees shown on Chart I. None of these was alarming save in the case with the high fever mentioned above. Serum reactions in the form of urticaria or arthritic symptoms were observed in twenty-eight of the fifty cases. Many of these reactions were annoying, but none was persistent and they were controlled with small repeated doses of adrenalin and a local application of calamine lotion. The matter of serum sickness following the use of this serum is interesting. According to Davidsohn^{4,5} as previously suggested by Taniguchi,¹⁵ serum sickness is associated with the injection of a heterophile antigen usually in the form of horse serum, and he has shown that patients suffering from serum sickness have a definite increase in the heterophile hemolysin in their sera. It is interesting to note that no deaths occurred in the twenty-eight cases showing evidences of serum sickness. Of the twenty-two showing no evidence of serum sickness, thirteen recovered, and nine died. Of these nine fatal cases, only two lived sufficiently long to reach the period in which these manifestations are usually observed. Seven of them died after illnesses of one to five days. One lived twenty-three days and another thirty-four days. The significance of this finding is not clear, but the recent work of Powell, Jamieson, and Kempf¹³

CHART X. FOURFOLD TABLE FOR THE FORTY-EIGHT
CASES UNDER SIXTY YEARS OF AGE TREATED
WITH HETEROPHILE SERUM
AND THE
SEVENTY-TWO CONTROL CASES UNDER SIXTY
YEARS OF AGE

	Number Recovered	Number Died	Total
Number treated	40 (a)	8 (b)	48
Number not treated	51 (c)	21 (d)	72
Total	91	29	120

indicates that heterophile antigen is not responsible for serum sickness.

In one case, Case 29 (Chart I) where the serum was used, a definite spread of the consolidation occurred and the patient died. The spread of the lesion following serum therapy may be interpreted to mean that in spite of the individual's natural resistance plus the passive immune bodies introduced, the virulence of the organism was sufficient to overwhelm the patient. One other instance not included in this series has been seen where progression of the lesion occurred after serum therapy. This patient recovered. It is possible that the dosage in the first instance was inadequate.

In Case 21 (Chart I) only 10,000 units of serum were given. The therapy was discontinued because it was thought useless in a case where the history indicated an onset ten days before admission to the hospital.

The degree of clinical improvement in each serum treated case is noted in Chart I. The principal points taken into consideration were: decrease in dyspnea, cyanosis, pulse rate, and delirium. In some instances, dramatic drops in temperature were noted, but in many of the cases the temperatures seemed to be affected only slightly in spite of evident decrease in toxicity. Of the fifty serum-treated cases, twenty-five were judged to have been markedly improved clinically; fourteen seemed to have shown moderate improvement; six were slightly improved, and five showed no effect of the therapy. In certain cases, the decrease in dyspnea and cyanosis was beyond any doubt.

Discussion

This is a preliminary report of a study which is being continued at the Ancker Hospital this

year. The evaluation of any given therapeutic measure is difficult, but it is felt that the analysis of this series of cases should be of some value in the eventual determination of the usefulness of heterophile antipneumococcic serum. Serum therapy in the treatment of lobar pneumonia is not comparable to that in diseases such as diphtheria where antitoxin is almost perfectly specific. The best that can be hoped for is a decrease in mortality. In this series, it was felt that at least half of the patients were definitely improved clinically following the therapy, but, as pointed out above, there has been no statistically proved decrease in mortality. The probability integral of .12 is encouraging, and if this or better probability figures can be shown in other similar series, the result would be considered encouraging. It is planned in the series now being studied to include determinations on the serum heterophile antibody in lobar pneumonia in treated and untreated cases.

Summary

A series of one hundred forty-six cases of lobar pneumonia have been analyzed. Fifty of these cases were treated with heterophile antipneumococcic serum. There was no statistically proved decrease in mortality, but statistical mor-

ality figures obtained and the clinical improvement observed in certain of the patients were sufficiently encouraging to warrant further study.

Bibliography

1. Bailey, C. Howard, and Shorb, Mary Shaw; Heterophile antigen in pneumococci. *Am. Jour. Hygiene*, 13:No. 3, 831-856, (May) 1931.
2. Bull, C. G.: The Newer Knowledge of Bacteriology and Immunology, edited by Jordon and Falk. University of Chicago Press, 1928, Chapter 53.
3. Davidsohn, I.: Heterophile Antigens and Antibodies. *Arch. of Path.*, 4:776-806, 1927.
4. Davidsohn, I.: Heterophile antibodies in serum sickness. *J. Immunol.*, 16:259, 1929.
5. Davidsohn, I.: Further studies on heterophile antibodies in serum sickness. *J. Immunol.*, 18:31, 1930.
6. Eisler, M., and Howard, A.: Ueber das Forssman Antigen der Pneumokokken. *Ztschr. f. Immunitätsforsch. u. exper. Therap.*, 76:461, 1932.
7. Finland, Maxwell, Rueggesser, James M., and Felton, Lloyd D.: Heterophile antibodies in pneumonia. *Jour. Clin. Invest.*, 14:683:690, (Sept.), 1935.
8. Finland, Maxwell, Rueggesser, James M., and Felton, Lloyd D.: Should heterophile antibody be used in the treatment of pneumococcic pneumonia. *Jour. Am. Med. Assn.*, 105:No. 15, (Oct. 12) 1935.
9. Forssman, J.: Die Herstellung Hochwertiger Spezifischer Schaffhamolysine ohne Verwendung von Schaffblut. Ein Beitrag zur Lehre von Heterologer Antikörperbildung. *Biochem. Ztschr.*, 37:78, 1911.
10. Izar, G., and Caruso, G.: Precipitation and concentration of substances in serum with antibody function. *Riforma Med.*, 37:1123-1124, (Nov. 26) 1921.
11. Izar, G., and Caruso, G.: Isolation of antibodies from immune serums. *Riforma Med.*, 38:145-146, (Feb. 13) 1922.
12. Jamieson, W. A., and Powell, H. M.: Further studies in the immunology of the pneumococcus. *Am. Jour. Hygiene*, 13:No. 3, 823-830, (May) 1931.
13. Powell, H. M., Jamieson, W. A., and Kempf, G. F.: On the relation of heterophile antigen to serum sickness. *Jour. of Immun.*, 29:No. 4, (Oct.) 1935.
14. Powell, H. M., Jamieson, W. A., Bailey, C. Howard, and Hyde, R. R.: A comparative study of antipneumococcus serum containing heterophile antibody. *Am. Jour. Hygiene*, 17:No. 1, 102-121, (Jan.) 1933.
15. Taniguchi, T.: Studies on heterophile antigen and antibody. *Jour. Path. and Bact.*, 25:77-93, 1922.
16. Topley, W. W. C., and Wilson, G. S.: The Principles of Bacteriology and Immunology, 2:748, 1931. Wm. Wood and Co., New York.

ACUTE ATROPHY OF BONE: REPORT OF AN UNUSUAL CASE INVOLVING THE RADIUS AND ULNA*

MELVIN S. HENDERSON, M.D.

Rochester, Minnesota

ACUTE atrophy of bone is a definite clinical entity distinct from the chronic atrophy of bone that follows disuse. Although Sudeck, in 1900, is generally credited with first establishing the condition as a clinical entity, it had been mentioned previously in the literature. Wolf touched upon the subject in 1877 and in 1883, and Kümmell first reported, in 1895, his classical cases of atrophy and collapse of the spinal vertebrae.

Clinical Manifestations

The condition is commonly seen in the extremities and spinal column. The lower extrem-

ity is affected more often than the upper and atrophy is usually limited to the bone of the foot, although the lower end of the tibia and fibula may also be involved. There is frequently an initial injury, although atrophy may develop spontaneously. Such injury is usually slight, a simple twist, a blow, or a bump, and there ensues a latent period which varies in length and may last a few days to a few weeks, although when the spinal column or long bones are involved it may extend into months. The signs vary according to the site of the disease. In the upper extremity the condition is manifested usually in the bones of the hands and wrists, and is more often seen following a severe injury, such as a frac-

*From the Section on Orthopedic Surgery, The Mayo Clinic, Rochester, Minn. Read before the Minnesota Academy of Medicine, October 9, 1935.

ture, than is the case in the lower extremity. Edema, cyanosis, and atrophy of the skin are the common objective signs, and pain and soreness the subjective. Wasting of muscle is commonly seen. In the lower extremity the disease usually lasts over a period of months, but it may last several years and cause total disability in the extremity affected.

Etiology

Noble and Hauser, in 1925, made a survey at The Mayo Clinic and reported forty-eight cases. They presented four theories for consideration. Gurd, of Montreal, has more recently furnished us with an excellent résumé of the subject.

Noble and Hauser propounded as their first theory one of reflex trophoneurosis, wherein the condition was attributed to constant irritation of the sensory transmitting impulses along afferent channels to the spinal ganglia, producing trophic changes in the skin and disintegration of bone. Sudeck, in his original paper, was of the opinion that the condition resulted from a low grade inflammation, but two years later, in 1902, he agreed with Kienböck that atrophy of bone was essentially trophoneurosis. I can recall several cases in which treatment was carried out at the clinic for acute atrophy of the bones of the foot and in which abscesses subsequently developed; following drainage of these abscesses recovery gradually took place. No definite connection was demonstrated in these cases between the abscesses and the bone. Briefly, the theory of trophoneurosis rests on the premise that on the production of a disturbance in the metabolism of bone, the bony substance is broken down more rapidly than it can be reconstructed.

Noble and Hauser's second theory, which was that of Hilgenreiner,^{4,5} favored the idea of inactivity. Hilgenreiner's conclusions were derived chiefly from the study of gunshot wounds. He believed that the chief etiologic factor was disuse, that the intensity of the atrophy was influenced by the individual disposition of the patient, and that atrophy occurred distal to the injury and resulted from ischemia. The advocates of the theory of disuse argue that the primary etiologic factor is disuse but admit that nerve injury, which produces vascular changes and also infection, may play a part. These latter factors they cover by the term "ischemia." Hilgenreiner believed that pain was an important causative

factor of the atrophy, whereas Sudeck, proponent of the theory of trophoneurosis, believed that pain was secondary to atrophy.

Noble and Hauser's third theory was that of infection, but it has very few advocates. To my knowledge there have been no cases reported wherein an actual inflammatory lesion has been demonstrated in the bone marrow, either microscopically or bacteriologically.

The fourth theory is that advanced by Cohn. He observed that there was a definite relationship between atrophy and regeneration of bone. He observed that when two bones lie side by side, one fractured and the other not, only the fractured bone showed atrophy, and that in some cases when the joint was involved atrophy proceeded in both directions. He attempted to explain these facts as being the result of a third type of bone formation, quite distinct from the endosteal and periosteal types. He argued that calcium was carried by the lymph vessels and deposited in soft tissue where there is a deficiency of carbon dioxide in the blood. According to him the roentgenograms disclosed shadows of calcium in the soft tissues in cases in which the type of regeneration of bone he described was playing an extensive part. His argument was that the atrophy seen in the roentgenogram was the result of a demand for calcium elsewhere. He argued that while in one case endosteal and periosteal regeneration might be sufficient, in another they might be insufficient, and this third type of formation of bone was then called into play. This theory, while presenting some attractive ideas, does not satisfactorily explain acute bone atrophy.

As a result of their study of cases at the clinic Noble and Hauser came to the conclusion that the only theory which appeared to explain satisfactorily all the pathologic processes in acute atrophy of bone was that of trophoneurosis. They concluded, and I agree with them, that the symptoms and signs of acute atrophy of bone are explicable by reflex irritation and by stimulation of the trophic nerves, producing an increase in metabolism in the tissues.

Radiologic Findings

Atrophy is often missed in reading a roentgenogram because there is no alteration in the form but only a diminution in the density of bone. Allison and Brooks demonstrated that dis-

use does not affect the chemical composition of bone, but that the proportions of water and inorganic and organic salts are markedly changed in a comparatively short time. There is less bone matrix rather than a change in the character of the bone, a quantitative rather than a qualitative change. This is immediately noticeable when comparison is made with a roentgenogram of a sound limb. The lesion is almost always distal to the site of injury, and the more distal the bones are the greater the atrophy. The roentgenogram discloses a moth-eaten appearance of the bones involved during the acute stage, this appearance being the result of what might be called perforations in the spongiosa. The lamellae are not clear cut but fade into one another. It usually takes from four to six weeks before these changes are manifested in the roentgenogram. As the condition becomes more chronic, the moth-eaten appearance disappears. The spongiosa becomes wide-meshed and the lamellae are thicker and stronger, but chiefly the longitudinal fibers. If atrophy continues over a long period the remnants of the spongiosa may be lost entirely.

Prognosis and Treatment

Acute atrophy of bone runs its course in from a few months to several years. Treatment consists of heat, contrast baths, massage, and active and passive movements, the former being by far the most important. Use to the point of toleration of the affected limb is indicated. Supports and braces and casts are contraindicated, as are manipulations, particularly under anesthesia. Leriche of recent years has advocated ganglionectomy and has reported cases showing its usefulness, but it seems rather a heroic measure for a condition that responds so well to conservative measures.

The forty-eight cases reported from the clinic by Noble and Hauser covered the period from 1912 to 1924. I have recently gone over our files at the clinic from 1930 to 1934, inclusive, and have found fifty-five additional cases. In eight of these acute atrophy occurred in the hand, in forty-seven in the foot and ankle. In eighteen of these forty-seven cases atrophy was definitely connected with trauma; in the remainder it could not be definitely classified as to etiology, although infection, disuse, and arthritis might have been a factor in some. A nota-

tion of interest was that those cases in which the onset was sudden and without apparent cause, and wherein swelling and pain came on rapidly and were persistent, were more resistant to treatment than were those in which atrophy followed trauma.

In marked contrast to this group was a case of acute atrophy of the bones of the forearm which I wish to report. In the roentgenogram in this case there was practically complete disappearance of bony substance in both the radius and ulna. The case in our experience is so unusual that I think it worthy of a somewhat full description; the fact that acute atrophy in the diaphyses of long bones is noted so rarely makes it one of unusual interest.

Report of Case

The patient, a man thirty years of age, came to the clinic in October, 1925. He had always been well until November, 1923, when he had fallen and injured his left arm. He had not paid much attention to this at the time, but had gradually begun to have discomfort in this arm. It was not until four months later (February, 1934), however, that it had become serious enough to interfere with his work. A diagnosis of rheumatism had been made and the pain had been relieved somewhat by heat. The arm had then become very much swollen and painful and the patient had consulted a physician. The arm had been placed in a splint for three weeks, and after it had been removed, heat and massage had been used for three months, but with little effect. The splint had then been reapplied. No definite diagnosis had been arrived at.

In August, 1924, that is, nine months after the onset, the patient had had general malaise, aches, and pains, with chills and fever. His ankles had become swollen and tender. He had gradually recovered from this, but in November, 1924, one year from the time of onset, he had had a second attack. He had been sent by his physician to take some mud baths, and at the sanatorium, while peeling an orange, he had had terrific pain in his forearm and had heard something snap. Roentgenograms, the first that were taken, had revealed the ulna to be a mere shell of bone and that it had fractured in its upper third. Soon after this the arm had been operated on and some bone removed, but a definite diagnosis had not been made. A great deal of drainage of a serous nature had followed and the feeling of malaise and generalized pain and swelling in the feet and ankles had cleared up. Roentgenograms taken two months later had shown even more atrophy of the ulna. Amputation had been advised. The patient had then consulted an orthopedic surgeon who advised against amputation, but he had removed a piece of bone from the ulna and sent it to a laboratory for diagnosis; the report returned was negative. The arm had then been placed in a cast and drainage had persisted until August, 1925. In October, 1925, while using the arm

ACUTE ATROPHY OF BONE—HENDERSON



Fig. 1. Atrophy of radial and ulnar diaphyses with pathologic fracture of upper third of radius and ulna.



Fig. 2. One year after bone graft to radius and eight months after bone graft to ulna.



Fig. 3. Twelve years after onset: loss of upper third of ulna with complete regeneration of radius.

for some trivial purpose, a pathologic fracture had occurred in the middle third of the radius, and the orthopedic surgeon who had previously been consulted had then changed his opinion and advised amputation. The patient's blood had been examined repeatedly for syphilis, with negative results; nor was there any history of it.

Physical examination at the clinic gave negative results except for the nonunion and extreme atrophy of the ulna and the fracture and atrophy of the radius. (Fig. 1.) In fact the patient was in robust general health, and the laboratory tests, including calcium, phosphorus, and blood tests, were all normal. The condition could not be accounted for and the advisability of amputation was seriously considered; finally, however, the patient was advised to wait and he agreed to stay under observation. In spite of medication, heliotherapy, and other measures, atrophy increased in degree and the bones became even more porotic. Several times, 3 or 4 ounces (85 to 113.4 gm.) of blood-tinged, serous fluid was aspirated from the forearm, but bacteriologic studies gave negative results and the guinea pig tests for tuberculosis were also negative. Finally, in August, 1926, almost three years after the onset and eight months after admission, when there seemed to be a little increased calcification, a large massive bone graft taken from the right tibia was placed on the radius. The radius was selected for operation because it was in better condition. The bone was so soft that the graft had to be tied to the radius with catgut sutures thrown around the fragments. The bone was so fragile and porotic that it would have been useless to attempt to use beef-bone screws or autogenous bone pegs to fix the graft to the fragments.

By January, 1927, roentgenograms revealed that the radius and the bone graft had united and both had

increased in density and in size. The ulna had not changed and was almost entirely absorbed. If any of the ulna was to be saved, action was necessary, so on January 18, 1927, a massive graft was placed on the ulna in the same manner as that which had been placed on the radius. Much hemorrhage was encountered, particularly at the upper end, where destruction had been greatest. In August, 1927, roentgenograms revealed that both bone grafts were in good condition and were increasing in size and strength, but that the upper end of the ulna was fading out of the picture more and more and the elbow was quite unstable. (Fig. 2.) My regret is that some effort to reconstruct the upper end of the ulna by aid of another bone graft was not made at this time.

I have heard from this patient at intervals, at least once a year, and roentgenograms sent us in February, 1935 (Fig. 3), give evidence of marked regeneration of the bone where the bone grafts were placed; the elbow, however, is flail, the upper end of the ulna being entirely absent. The radius is fully restored. The patient reports that, aside from the "wobbly" elbow, he has an excellent hand and forearm.

The condition encountered in this case is, in our experience, unique; an acute atrophy finally going on in a period of two years to almost total disappearance in the roentgenogram of the ulna and the radius. Bone grafting saved the radius and the lower two-thirds of the ulna. We have no adequate explanation to offer as to the etiology. The trauma was comparatively trivial and there ensued a latent period. At the time the operations were performed at the clinic pieces of tissue

and bone were sent to the Section on Pathology. No evidence of any malignancy or new growth was reported, the tissue revealing only inflammatory changes. The swelling, pain, serous drainage, malaise, and swelling of the ankles and feet all point to toxicity. Was it inflammatory or metabolic (trophoneurotic) in origin? I am not at all certain, though I favor the metabolic theory.

Bibliography

1. Allison, Nathaniel, and Brooks, Barney: Bone atrophy. An experimental and clinical study of the changes in bone which result from non-use. *Surg., Gynec. and Obst.*, 33: 250-260, (Sept.) 1921.
2. Cohn, Max: Ueber die Beziehung zwischen Knochenatrophie und Knochenregeneration auf dem Wege der Kalkwanderung. *Arch. f. klin. Chir.*, 112:231-246, 1919.

3. Gurd, F. B.: Post-traumatic acute bone atrophy (Sudeck's atrophy). *Ann. Surg.*, 99:487-496, (Mar.) 1934.
4. Hilgenreiner, H.: Die Knochenatrophie nach Schussfrakturen der Extremitätenknochen und ihre diagnostische, prognostische und funktionelle Bedeutung. *Beitr. z. klin. Chir.*, 112:473-509, 1918.
5. Hilgenreiner, H.: Gibt es eine Sudecksche Knochenatrophie? *Beitr. z. klin. Chir.*, 129:683-699, 1923.
6. Kienböck, Robert: Ueber Knochenveränderungen bei gonorrhöischer Arthritis und akute Knochenatrophie überhaupt. *Wien. klin. Wchnschr.*, 16:57-63; 99-105, (Jan.) 1903.
7. Kümmel, H.: Ueber die traumatischen Erkrankungen der Wirbelsäule. *Deutsch. med. Wchnschr.*, 21:180-181, 1895.
8. Noble, T. P., and Hauser, E. D. W.: Acute bone atrophy. *Coll. Papers of Mayo Clinic*, 16:847-866, 1924.
9. Sudeck, P.: Ueber die akute entzündliche Knochenatrophie. *Arch. f. klin. Chir.*, 62:147-156, 1900.
10. Sudeck, P.: Ueber die akute (reflektorische) Knochenatrophie nach Entzündungen und Verletzungen an den Extremitäten und ihre klinischen Erscheinungen. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, 5:277-293, 1901-1902.
11. Sudeck, P.: Ueber die akute (trophoneurotische) Knochenatrophie nach Entzündungen und Traumen der Extremitäten. *Deutsch. med. Wchnschr.*, 28:336-338, 1902.
12. Wolff, Julius: II. Ueber tropische Störungen bei primären Gelenksleiden. *Berl. klin. Wchnschr.*, 20:422-426, (July 9) 1883.

URETHRAL DIVERTICULUM*

WALTMAN WALTERS, M.D., and NORMAN W. THIESSEN, M.D.†

Rochester, Minnesota

URETHRAL diverticulum or urethrocele is a rather infrequent finding. This is true not only because of the actual rarity of the condition, but also because it may be symptomless until infection occurs. Watts surveyed the literature of 1906, collected thirty-nine cases, adding one of his own, and suggested a classification. Carlton, in 1932, found 100 cases reported in the literature, and numerous isolated reports of such cases have appeared in the literature since then. The apparent increased incidence is no doubt due to the recent widespread use of cystourethroscopy as a diagnostic procedure.

Urethral diverticulum may be defined as a pouch or outpocketing, the lumen of which is continuous with that of the urethra. False diverticula composed of scar tissue may develop following periurethral abscesses and should be differentiated from true diverticula which are lined with squamous epithelium and whose walls frequently contain smooth muscle fibers. This differentiation is not always accurate, however, because a false diverticulum, if well drained, may acquire an epithelial lining, whereas a true diverticulum may lose its lining as a result of inflammatory changes. The usual classification given is that of Watts, but LeComte and Herschman recently modified it from a clinical stand-

point and based it on the location of the orifice of the diverticulum.

These urethral diverticula may be either congenital or acquired. Theoretically, according to LeComte and Herschman, a congenital diverticulum may be due to (1) defective union of the urethral plates derived from the entodermal genital tubercle, as these close to form the urethra on the under side of the penis, (2) defective union of that part of the urethra derived from the pars phallica of the genital tubercle with that derived from the urogenital sinus posteriorly, or from its union with the glans penis anteriorly, or (3) misformed or overlapped glands. Cysts of congenital origin may later rupture into the urethral lumen, thus presenting a combined type of etiology. Acquired types of diverticula are usually due either to trauma or to infection.

During the years 1924 to 1934, inclusive, nineteen patients with urethral diverticulum were operated on at The Mayo Clinic. Fourteen of the patients were women, their average age being 41.3 years; the average age of the five men was 47.4 years. All of the diverticula of male patients were situated in the posterior portion of the urethra with the meatus opening into the prostatic portion or into the urethral lumen between the external and internal sphincters. In the cases in which the patients were women, six of the diverticula opened into the posterior por-

†Dr. Walters is a member of the staff of the Division of Surgery, The Mayo Clinic, and Dr. Thiesen is a Fellow in Surgery, The Mayo Foundation, Rochester, Minnesota.

tion of the urethra, three between the sphincters, and one opened into the anterior part of the urethra; in four cases the position was not stated. Furniss has pointed out that numerous glands analogous to those found in the prostate gland occur in the floor of the female urethra, any one of which may be a potential diverticulum.

The etiology of the lesion was difficult to determine, attention being called to the condition only by infection. The symptoms of which the patient complained were usually frequency, dysuria, a dribbling of urine, and hematuria. Some patients had perineal pain of a dull character. Two women complained of a vaginal mass, pressure on which caused a urethral discharge. Stones formed in the sac in two cases, whereas in one an epithelioma of grade 3 was found at operation. Excision of the sac and reconstruction of the urethra was carried out in fourteen cases: In one case partial excision was done; in one case the lining of the diverticulum was cauterized; in two cases the infected sac was drained and packed, and in one case examination only was carried out. The results, as judged by freedom from symptoms and control of urinary flow, were excellent in one case, good in six, fair in four, and were not noted in two cases. The ultimate result was poor in one case because of a later exacerbation of a coexisting ulcerative cystitis; one patient died four days after operation from a cardiac condition.

One of us (Walters) within the past six years has operated on four patients with urethral diverticula. These cases differed in no essential respect from those in the rest of this series, except Case 4, in which the diverticulum was especially large.

Report of Cases

Case 1.—A married woman, aged thirty-five years, came to the clinic complaining of general debility and recurrent attacks of what had been diagnosed as cystitis and pyelitis. Physical examination gave essentially negative results. Laboratory examination revealed urine which contained albumin grade 4, and pus, grade 4. There was no anemia, but there was a leukocytosis, cells numbering 17,000 per cubic millimeter. The flocculation test for syphilis was negative. Roentgenograms of the thorax and abdomen were reported negative. Cystoscopy revealed chronic cicatricial urethritis, the urethra being filled with a purulent secretion. There was a small urethrocele which was infected. Local treatment to the urethra gave the patient only mod-

erate relief, and operation for the urethrocele was advised. The patient preferred medical treatment and a regimen was outlined for her.

The patient returned one year later with her old symptoms made worse by pain and spasms during micturition. Physical examination again gave negative results. Analysis of the urine showed an occasional erythrocyte and pus cells, grade 2. On cystoscopic examination a small opening in the left side of midurethra was visualized. Into this opening about 3 cm. of catheter could be passed. A urethrogram visualized the pocket demonstrated on cystoscopy. Because of the continued symptoms, operation was performed. Through a midline incision in the anterior vaginal wall, the under surface of the urethra and bladder was exposed. A diverticulum was found with its opening between the internal and external sphincters. The opening into the urethra was then closed with interrupted sutures of chromic catgut. The postoperative convalescence was uneventful, and the patient was dismissed from the hospital on the eleventh postoperative day.

Case 2.—An unmarried woman, aged thirty-eight years, came to the clinic complaining of intermittent enuresis of six months' duration. The doctor at her home had cauterized an urethral polyp, following which a periurethral abscess had developed. Two recurrences of the abscess had taken place during the six months prior to admission. The patient's chief trouble at the time of admission was a feeling of discomfort and pressure in the region of the urethra.

On physical examination a mass about 2 by 2 cm. was palpated under the urethra, above the anterior vaginal wall. Laboratory examination revealed nothing abnormal. On cystoscopic examination a diverticulum was visualized with its opening to the left of the midline and approximately 1 cm. distal to the sphincter. At operation, which was performed through a vaginal incision, the diverticulum was inverted and was obliterated by interrupted sutures. The patient's postoperative convalescence was uneventful and she was dismissed on the eleventh postoperative day.

The patient remained perfectly well for six months when, following a severe attack of influenza, she again began to have some dysuria and a slight urethral discharge. On reexamination at the clinic some purulent material was expressed from the urethra by pressure high on the left side through the vagina. At operation, through a vaginal incision, a small abscess cavity was drained and a minute opening into the urethra was closed. There was no other evidence of retention pockets or of a diverticulum. The patient's postoperative convalescence was uneventful and she was dismissed from the hospital on the ninth postoperative day. She returned to the clinic one year later with an entirely new complaint, and stated that she had only occasional twinges of pain at the site of her previous trouble. This case represents examples of both true and false diverticula.

Case 3.—A married woman, aged thirty-five years, came to the clinic complaining of dysuria since an operation for ectopic pregnancy seven years previously.

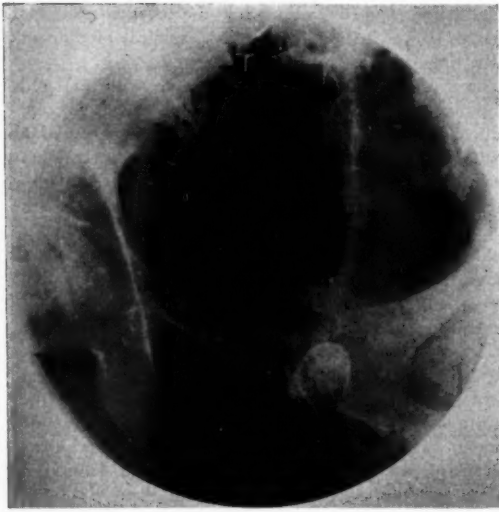


Fig. 1. A urethral catheter is coiled in the urethral diverticulum, which is visualized over the symphysis pubis.



Fig. 2. The excised diverticulum, showing its size.

Cystoscopic examination done elsewhere had revealed nothing abnormal, but the urethral orifices had been cauterized because they looked small. This procedure had relieved the patient of some of her distress for a few months, but her symptoms soon returned.

Physical examination at the clinic gave negative results, as did all of the laboratory investigations, except for the finding of pus, grade 2, in the urine. Cystoscopic examination revealed a pocket, 1 cm. in diameter, just distal to the sphincter; pressure through the vagina on this pocket expressed mucopurulent material from the urethra. Dilatation of this pocket with water reproduced pain similar to that which the patient had had. At operation, the diverticulum was destroyed with the cautery and the urethra was closed with interrupted sutures. The postoperative convalescence was without

incident and the patient was dismissed from the hospital on the fifth postoperative day. The patient reported by letter two years later that she was completely free of symptoms and that urinary control was unimpaired.

Case 4.—This patient, an unmarried woman aged thirty-six years, came to the clinic complaining of trouble with her bladder which had been present for two years. Her symptoms had begun with leukorrhea, accompanied by frequency and dysuria. During the two months prior to her admission she had been troubled with increased frequency, nocturia, and the passage of pus and blood in the urine. Lavage of the bladder elsewhere had given no relief.

Physical examination gave essentially negative results. Laboratory investigations were negative except for the urinary findings. The urine contained gross pus and blood and albumin, grade 2. Cystoscopy revealed a diffuse cystitis and elevation of the trigone, due either to the infection or some extravescical deformity. Stains of the vesical sediment disclosed many gram-negative rods, but no bacilli of tuberculosis. Intravenous urograms showed the kidneys to be normal both in outline and function. After a few days of lavaging the bladder reexamination revealed a diverticulum 4 by 3 cm. posterior to the urethra (Fig. 1). At operation, the anterior vaginal wall was dissected away and the diverticulum was removed (Fig. 2).

Postoperative convalescence was uneventful, and the patient was dismissed from the hospital on the eleventh postoperative day. There was a moderate degree of incontinence when the bladder became full, but the patient reported that this was improving.

Summary

Nineteen cases of urethral diverticulum, in which operation was performed in the years 1924 to 1934, inclusive, at The Mayo Clinic, are reported.

The results, as judged by freedom from symptoms and control of urinary flow were excellent in four cases, good in seven, fair in four, and were not noted in two. One patient died from a cardiac condition postoperatively and one patient, three years later, underwent an operation for an ulcerated condition of the bladder. Success in the management of this lesion depends on maintenance of urinary control and on adequate treatment of any urinary infection.

Bibliography

1. Carlton, C. H.: Diverticulum of the male urethra with a suggestion as to its origin. *Brit. Med. Jour.*, 1:376-377, (Feb. 27) 1932.
2. Furniss, H. D.: Sub-urethral abscesses and diverticula in the female urethra. *Jour. Urol.*, 33:498-503, (May) 1935.
3. LeComte, R. M., and Herschman, M. J.: Diverticula of male urethra. *Jour. Urol.*, 30:463-474, (Oct.) 1933.
4. Watts, S. H.: Urethral diverticula in the male with report of a case. *Johns Hopkins Hosp. Rep.*, 13:49-89, 1906.

DIETARY AIDS IN CONTROL OF CONSTIPATION AND DIARRHEA*

PHILIP W. BROWN, M.D.

Rochester, Minnesota

IN CASUALLY turning the pages of a current magazine, there loom forth numbers of advertisements urging, "Eat this!" "Drink that!" "Send for free diet list!" This may explain somewhat why patients have become "diet-minded" and have come to believe that a set diet list is necessary for a cure of their stomach and bowel troubles. Only recently a patient scathingly commented to me, "Well you wouldn't last ten minutes in, unless you had on hand several diet lists." The physician is often assailed with a request for a diet before he has even made an investigation or decided on his plan of treatment. It is well to return to the realization that the problem of constipation or diarrhea is not an abstract affair but of vital, individual concern, and that individual advice is necessary. Principles may be true but it is important to fit them to the patient, and not vice versa. During these recent years, diet has assumed a very prominent place in treatment and justly so, for as good a fuel mixture as can be tolerated is essential to the proper function of the body. It is my purpose to suggest some of the dietary principles in relation to constipation and diarrhea, so that the developments in the field of dietetics and nutrition may be applied to the individual.

Probably 75 per cent of the people in this country are more or less constipated, which is one reason for the miles of advertising in periodicals and billboards. Formerly, constipation might be dignified by attributing it to a sluggish liver, while more recently Axel Munthe, in "The Story of San Michele," showed the reward to be derived by invoking as a cause mucous colitis, spastic colitis, and so forth. In constipation, as commonly understood, I believe that diet has been unduly emphasized and even more objectionable in many instances has been the encouragement to over-distend the bowel with artificial bulk. Not enough stress has been placed on the importance of changes in occupation, nervous strain, and the whole complex whirl of living. So often is the tired mother, the nervous clerk or

teacher, prescribed a diet that contains as much indigestible material as possible. It is recognized that the tendency to eat concentrated foods exists, but, if a patient has that habit, sudden overloading with quantities of roughage usually makes his condition worse.

It would seem wise to emphasize the general question of constipation and to minimize, rather than to stress, any possible unpleasant features of being constipated. One need not be careless or flippant but certainly all agree that there has been far more fuss and furor about missing a bowel movement for a day or two than is warranted. As with other parts of the body, a "short circuit" from colon to brain may give more symptoms than the colon alone. It is wise to withhold suggestions concerning diet until the end of the consultation. The physician should be sure that adequate intake of fluids is maintained, about 2 quarts (2 liters) daily; more if there is excessive sweating. It is well to include two glasses of milk, meat at least once daily and twice if the person is active, one or two eggs, and to fill out the remainder of the diet list with any and all of the fruits and vegetables, cooked or raw. Some people are better if fruits and vegetables are cooked.

The old maxim, "one man's food is another man's poison," is always applicable and this, by the way, can be taken as a criticism of any printed diet that is passed out indiscriminately. One should be alert to the intolerance of certain patients to certain foods, whether such intolerance is attributable to possible cholecystitis or to allergy. It is necessary to know the tolerance of the individual patient as learned from intelligent observation. Supplementing of natural foods with artificial bulk may be done with agar but I think the need of bulk should not be emphasized habitually. Speaking in general, bran and preparations of whole wheat are best omitted from any diet. I do not forbid them if the patient has been getting results, but I do not advise them.

The general incidence of diarrhea is less than that of constipation but the very nature of the

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Southern Minnesota Medical Association, Austin, Minnesota, August 26, 1935.

trouble is such that the patient is insistent that measures be taken which will permit him to live without having to remain in the proximity of the bathroom. As this article deals only with dietary suggestions, without regard to specific diseases, it is easier to consider the diet as it applies to acute and to chronic types.

There is the oft-repeated observation, especially with reference to cases of chronic diarrhea, that, no matter what the etiology, the general status and nutrition is further impoverished by dietary restrictions. The patient, in his eagerness to be relieved of his trouble, observes all the "don'ts" of his advisers, both medical and lay, with the expected result of a most amazingly inadequate dietary. The more common acute forms of diarrhea, such as those attributable to infection by staphylococci, bacilli of dysentery, or salmonella, are usually self-limited to a few days. In such instances, it is unnecessary to urge the taking of food for the first twenty-four hours; in fact, resting the bowel is more helpful than giving food. After twenty-four hours, the best foods are beef, mutton, rice, broths, eggs, toast, tea, and coffee. To these basic foods of low residue may then be added custards, potatoes, simple puddings and stewed fruits. Early in the illness, an adequate supply of fluid is much more important than food and often it may be necessary to administer salt solution by vein or under the skin.

Milk is often advised for patients who have acute diarrhea, but even if milk is boiled it leaves a large residue in the bowel. In general, it seems better to withhold milk until the active phase has subsided.

Experimentally, it has been shown that chunks of meat are digested better than is minced or scraped meat. This may not be entirely true for the intestine of man, yet a piece of steak or roast beef is more palatable than a hash mixture, and possibly better physiologically.

In cases of chronic diarrhea, it is obvious that every effort should be made to establish the cause. In these cases, the frequent stools result in loss of essential elements of food and electrolytes. Wakefield and Welch recently have dem-

onstrated the high loss of fats and proteins in the stools of patients who have chronic ulcerative colitis. Sodium and calcium are lost at a rate well above normal. Hence, a basic principle in cases of chronic diarrhea is not to restrict but to increase the dietary, although avoiding excess residue. Far more harm is done by a too limited than by a too liberal diet. At the onset it is well to include 60 to 100 gm. of protein, such as beef, mutton, eggs, cheese, and small amounts of puréed vegetables in milk soup. Then the stewed fruits and vegetables should be added slowly. If a disease has been present for some time and may continue for an indefinite period, the diet must be generous and must sufficiently approach completeness to avoid malnutrition, as well as to protect against deficiency states. The principal vitamins are now available in concentrated form. Calcium, administered orally when the stomach is empty, supplements a diet low in milk.

If digestion of fat is faulty, the diet best tolerated is usually low in fat, fairly high in protein, and rich in carbohydrate.

In certain cases in which the diarrhea is attributable to some particular food or foods, elimination diets will have to be tried. It is not within the scope of this discussion to go into details of this phase of allergy but it should be borne in mind that many cases of chronic diarrhea, often diagnosed as purely functional in type, are actually attributable to some offending article of diet. Yet, as in all the other types of chronic diarrhea, the goal of a diet sufficient in essential food elements, as well as calories, must never be forgotten.

Summary

Certain general dietary principles can be applied to constipation and the more common types of diarrhea, but general, printed diet lists are inadvisable. The diet must fit the needs in the individual case. It is essential that an adequate, well balanced dietary be prescribed. Patients should be cautioned against following peculiar or unsound eating habits.

Bibliography

1. Wakefield, E. G., and Welch, C. S.: Unpublished data.

THE RECOGNITION AND CONSERVATIVE TREATMENT OF HYDRONEPHROSIS*

THEODORE H. SWEETSER, M.D., F.A.C.S.

Minneapolis

IN SO FAR as one can say that anything in medicine is always true, one can say in the broad sense that hydronephrosis is always due to urinary obstruction. To make such a broad statement one must include atonic or paralytic as well as mechanical obstruction. If unrelieved, such an obstruction sooner or later causes atrophy of the renal tissue. Therefore, when possible, the obstruction should be found and removed before the kidney is destroyed.

When the obstruction occurs in the lower part of the urinary tract, the hydronephrosis is bilateral, and may develop insidiously, going on to almost complete pressure atrophy of both kidneys with but few and slight symptoms referable to the kidneys. Removal of the evident primary obstruction in the lower urinary tract may give a clinical cure if the damage has not been too great. However, in the meantime, some secondary obstruction may develop higher up in the urinary tract, such as kinking of the ureteropelvic junction following release of tension on the overdistended pelvis and ureter. Such a secondary obstruction may persist after relief of the primary obstruction and may cause disappointment, if not recognized and relieved.

At the time that hydronephrosis is first recognized the primary and secondary obstructive factors may have become so complex that very careful study may be necessary to discover and evaluate them all. Often the patient is brought to his physician because of some secondarily developing renal ailment such as infection or calculus formation. Failure to care for all the obstructive factors has been one cause of failure in the conservative treatment of hydronephrosis. Even complete relief of a mechanical obstruction may fail when an associated or underlying neurogenic factor is overlooked. Von Lichtenberg,⁶ of Berlin, in 1929 reported that among eighty operations for renal obstruction the obstruction was of neurogenic origin in 27 per cent.

When hydronephrosis is suspected, a complete systematic examination should be made in order to discover and evaluate all the factors involved. One must not neglect the careful history and general physical examination, including genital and rectal examinations and urinalysis. A flat roentgenogram of the urinary tract, intravenous urograms, and even a cystogram and urethrogram may indicate the diagnosis, but will usually

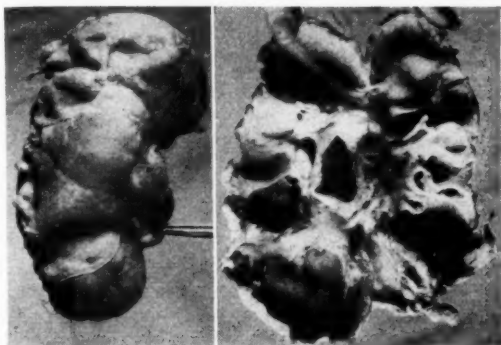


Fig. 1, a.

Fig. 1, b.

have to be corroborated and supplemented by the usual urologic study. Urethroscopy may disclose valves or strictures or prostatic hypertrophy. Cystoscopy may show a calculus, diverticulum, tumor or ureterocele. Ureteral catheters may encounter a calculus, stricture or tumor. If the catheter is opaque to x-ray it may suggest hydronephrosis by its wide curve or loop beyond the kidney shadow. A large amount of urine aspirated or running from the ureteral catheter would be pathognomonic. The functional dye test would be of value, although it must be remembered that an apparently poor function in an obstructed kidney has been known sometimes to improve greatly with drainage by the indwelling ureteral catheter or nephrostomy tube. Finally, bilateral pyelo-ureterography or pyeloscopy, using supine and erect postures, if necessary, will clinch the diagnosis. Such retrograde urography will give detailed information not obtainable by the intravenous method, but occasionally one must depend entirely on the

*From the Division of Surgery, St. Mary's Hospital, Minneapolis, and the Urology Department, Minneapolis General Hospital. Read and awarded the gold medal at the annual meeting of the Southern Medical Association, Austin, Minnesota, August 26, 1935. Because of lack of space, some of the illustrations have been omitted.

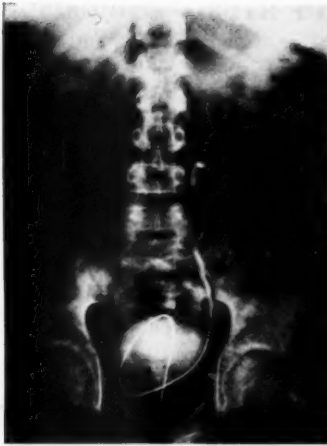


Fig. 2, a.

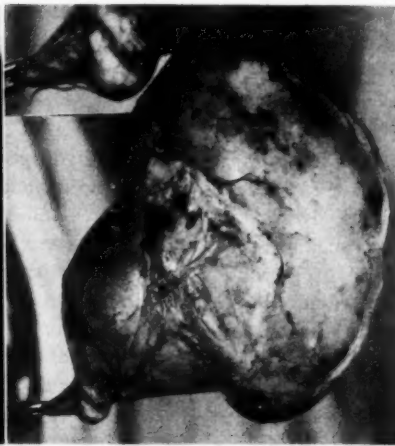


Fig. 2, b.



Fig. 2, c.

In Figure 2, b, note from the groove in the pelvic outlet that the ureter has been uncoiled; some of the fibrous bands at this point have been divided.



Fig. 3, a.



Fig. 3, b.

intravenous method when one is unable to catheterize the ureters. The complete diagnosis having been made, the treatment will depend upon the conditions found.

Simple unilateral or bilateral hydronephrosis, without or with only moderate infection, is often overlooked for years but can be recognized if one is alert. Evidence of mechanical obstruction is usually found at or near the ureteropelvic junction. There has been much controversy as

to the really primary causes and the secondary results of the obstructions. Abnormal renal mobility, aberrant vessels and other anomalies, fibrous bands, adhesions, kinks, inflammatory and congenital strictures, stones, tumors, and parasites have been found. Among the symptoms and signs in such cases may be:

1. Dull pain in the abdomen or flanks, usually not radiating downward but often affected by posture.
2. Attacks of acute pain, sometimes suggesting renal colic. During such attacks the kidney may be tender to lumbar percussion.
3. Mass in the flank, not always palpable.
4. Abnormal urinary findings: hematuria, pyuria or occasionally evidence of nephritis. The urine may be normal.
5. Reflex gastro-intestinal disturbances which in some cases completely overshadow the urinary symptoms.
6. After months or years of unrelieved distress, these patients may become quite neurotic.

The treatment of hydronephrosis may require treatment of an obstruction in the lower urinary tract. If the obstruction is in the ureter, passage of catheters or bougies may give relief. Obstructions at the ureteropelvic junction may be relieved by a properly fitted binder and pad with temporary postural treatment and a gain of weight by diet. In some, a temporarily indwelling catheter may be needed. In others, a nephropexy with or without temporary nephros-

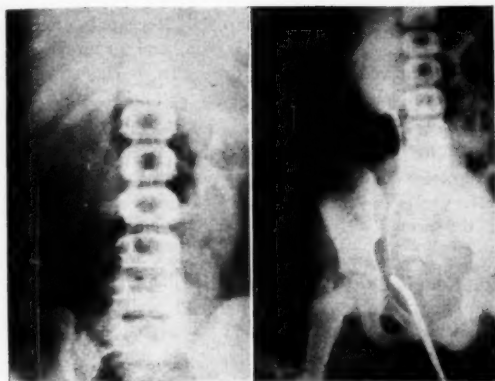


Fig. 4. a.

Fig. 4. b.

tomy drainage may be necessary to insure permanence of the relief. Nephropexy and nephrostomy are often used in conjunction with plastic operations.

Nephrectomy is indicated when one kidney has been largely destroyed and the other is normal. Hinman² recommends nephrectomy for even the small hydronephrotic kidney when the other kidney is normal, feeling that the damaged kidney will not regenerate when the other is normal. Keyes has said that one can not operate conservatively on materially infected kidneys. However, Quinby³ has said that "all surgery should be constructive wherever possible and safe, rather than destructive," feeling that one can never say what stresses the patient may undergo later. Sometimes the decision between nephrectomy and some conservative operation is a most difficult problem in surgical judgment. In a series of forty-seven conservative operations, von Lichtenberg⁶ was obliged to do secondary nephrectomy three times. Walters and Braasch⁷ reported one secondary nephrectomy in a series of ten conservative operations. One of my patients has had a secondary nephrectomy. The choice of operation is sometimes difficult. I feel that one should always be prepared to perform a conservative operation even in cases where preliminary study indicates that nephrectomy will probably be necessary. Of course, when both kidneys are affected, conservative treatment is obligatory; in fact, conservative surgery gives its best results in cases of bilateral hydronephrosis.

When conservative surgery is undertaken for

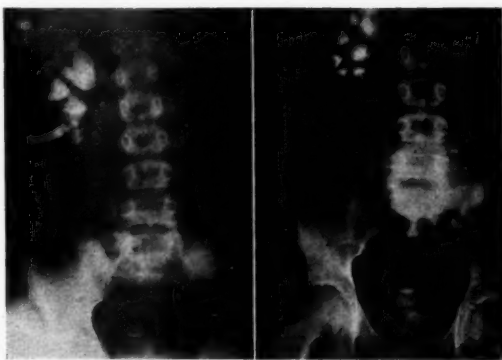


Fig. 5. a.

Fig. 5. b.

hydronephrosis, the type of operation must suit the individual case; a poor choice may vitiate the result though the operation be well performed. Among the methods used are:

1. Freeing of bands and adhesions and kinks with or without nephropexy.
2. Various plastic procedures at the ureteropelvic junction such as the Heineke-Mikulicz or Finney incision or the procedure suggested by Arnold Schwyzer,⁴ in 1923.
3. Transplantation of the ureter to a more dependent and free part of the pelvis.
4. Plication of the pelvic wall.
5. Resection of the renal pelvis by one of various methods described.

Any of these procedures may be combined with nephropexy and with nephrostomy. Preliminary drainage by ureteral catheter or nephrostomy may improve the prognosis. For nephrostomy I have been well pleased with use of the method described by Cabot and Holland,¹ in 1932. Splinting of the upper ureter by ureteral catheter is often of value at time of operation. In any conservative operation for hydronephrosis one must insure relief of all obstructive factors if he is to avoid disappointment.

Illustrative Cases

Case 1.—Stricture of urethra, traumatic. A man, forty-seven years old, was admitted for an acute respiratory infection and uremia. He had fallen astride a barbed wire fence twenty-six years ago, and had bled from the urethra. He had not been treated then, but was treated with sounds seven years ago. Dysuria had been present for the last three months. I was able to pass filiform bougies and followers. The blood

HYDRONEPHROSIS—SWEETSER

urea nitrogen was 119.7 mgm. per 100 c.c. and the creatinine 5.8 mgms. He died from uremia and broncho-pneumonia. Autopsy showed urethral stricture, a thick-walled, badly infected bladder, bilateral

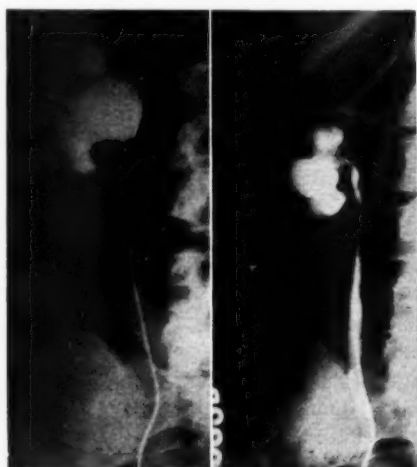


Fig. 6, a.

Fig. 6, b.

hydro-ureter, and bilateral infected hydronephrosis with a cortical abscess of the left kidney.

Case 2.—Hypertrophy of prostate. A man, eighty-four years old, entered the hospital in uremia and died from terminal broncho-pneumonia. Autopsy showed hypertrophy of the prostate, especially the middle lobe, and bilateral hydronephrosis and hydro-ureter.

Case 3.—Rectosigmoid carcinoma. A woman, thirty-three years old, had complained, for one year, of pain in the left lower abdominal quadrant radiating to the left lumbar region. Hydronephrosis and hydro-ureter due to pressure on the lower ureter were demonstrated by rapid drainage on catheterization of the ureter and by pyelo-ureterogram; injection of the sodium iodide solution reproduced the pain of which she had complained. Ureteral drainage completely relieved her pain for some time. Further investigation demonstrated an inoperable rectosigmoid carcinoma which later caused her death.

Note: In other similar cases in my series the carcinomas have originated in the bladder and uterus.

Case 4.—Pregnancy. A woman, eight months pregnant, with signs of urinary infection, was not relieved by the usual medical treatment. Urography showed hydronephrosis and hydro-ureter, with the ureteral catheter actually coiled in the ureter; the fetus was also shown. Complete relief of obstruction followed parturition.

Case 5.—Traumatic ureteral stricture. A young man was shot through the pelvic region in May, 1934, the bullet grazing the lower right ureter. In June, 1935, he returned with pain in the right flank. Ureteral catheterization demonstrated a stricture of the ureter,

and intravenous urography showed moderate right hydro-ureter and hydronephrosis. Repeated ureteral catheterization gave relief of pain, and urography in August showed neither hydronephrosis nor hydro-ureter.

Case 6.—Ureteral calculus. A man, twenty-nine years old, had repeated attacks of right renal colic. Urography showed right hydronephrosis and hydro-ureter with two non-opaque calculi in the lower part of the ureter. Ureterolithotomy gave relief.

Case 7.—Horseshoe kidney. A man, fifty years old, had pain in the left side of the abdomen for fourteen years, worse on standing and walking, relieved by sitting or lying down, and associated occasionally with hematuria, which findings led to the urologic examination. The wide loop of the catheter beyond the kidney shadow suggested hydronephrosis, and the pyelogram proved it and localized the stone shadows. The pyelography also clinched the diagnosis of horseshoe kidney. The hydronephrosis may have been due to pressure on the ureter by the renal isthmus rather than to the calculi. Left heminephrectomy gave complete relief.⁵

Case 8.—Vessels to lower pole of kidney. A man, twenty-two years old, had severe attacks of pain in the left lower quadrant for at least eleven years. As a child he learned to lie on a hot air vent for relief when he had the attacks. He was seen by various physicians who had no idea of the source of the trouble until one physician felt a mass in the left flank and requested a urologic study. I found an extreme degree of hydronephrosis of the left kidney with almost no function, necessitating nephrectomy (Figs. 1, a and b).

Case 9.—Fibrous bands distorting the ureteropelvic junction. A boy, thirteen years old, had pains in the left side of the abdomen about every three months, associated with vomiting. A pediatrician had treated him for "spasmodic intestine." During the last eight months he had three attacks of pain, in the last of which the pain reached the back for the first time. A barium enema demonstrated displacement of the transverse colon upward, and of the descending colon forward and laterally. Intravenous urography failed to show any excretion from the left kidney. Retrograde urography showed a normal left ureter and a kink at the ureteropelvic junction, with practically no skiodan reaching the renal pelvis (Fig. 2, a). At operation the ureteropelvic junction was tightly coiled on itself and tightly bound down by fibrous bands; the kidney itself was a mere shell and had to be removed (Fig. 2, b and c).

Case 10.—Fibrous bands and adhesions and very small anomalous vessels. A woman, twenty-two years old, had had pain in the right side at the age of fifteen years. Two laparotomies had been performed without relief of the pains. I demonstrated a hydronephrosis (Fig. 3, a), but she had three attacks of pain in nine months while under non-operative treatment (binder and pad, dietary regulation and other measures), and operation was finally performed. Release of adhesions

and fibrous bands over the renal pelvis and division of very small blood vessels to the lower renal pole completely relieved the obstruction; nephropexy completed the operation. A pyelogram, ten months later (Fig. 3, b) showed the renal pelvis reduced in size with free drainage. She had no more pain.

Case 11.—Anomalous vessels to lower pole of kidney. A girl, six years old, first seen by me in September, 1933, had had attacks of abdominal pain for about one year. A severe attack in July, thought to be an intestinal upset with pain and mass in the right abdomen, was relieved by elevation of the foot of the bed. When pain and tender mass recurred with fever, her physician had an intravenous pyelographic study which showed a large non-functioning right kidney and a normal left kidney. Cystoscopy and retrograde pyelography by me showed a large, infected right hydronephrosis with obstruction at the uretero-pelvic junction. After twelve days of drainage by ureteral catheter, the right kidney was explored. The cortex being fairly well preserved, a plastic operation on the renal pelvis was done by the technic of Young and Didusch.⁸ Nephropexy and nephrostomy by the technic of Cabot and Holland completed the operation. After a convalescence made stormy by the infection which had been previously recognized, the patient made a good recovery and is in good health. Figure 4 shows the condition before operation: (a) intravenous and (b) retrograde pyelography. Figure 5 shows (a) the condition soon after operation; (b) the improvement evident one year later—pyramids more prominent, calices smaller, no dilation of pelvis.

Case 12.—Anomalous vessels to lower pole; failure of conservative operation because of persistent pyelonephritis. A woman, forty-seven years of age, first noticed hematuria and urinary infection in 1929 during an attack of upper respiratory infection; an operation on the right kidney was then advised but refused. The urinary infection and hematuria recurred with each recurrence of respiratory infection, though it was temporarily relieved after tonsillectomy, in 1931. In March, 1934, she began to have dull pain in the right

lumbar region with hematuria. The hemoglobin reading was 51 per cent. Cystoscopy, on April 13, 1934, showed bloody urine from the right ureter, and cultures showed infection in the right kidney. Pyelography (Fig. 6, a) demonstrated a severe degree of right hydronephrosis and a normal left kidney. At operation, on April 18, 1934, there was difference of opinion as to the advisability of trying to save the badly damaged kidney, but I made the attempt. Because of the shortness of the renal pedicle it was necessary to modify the Young-Didusch procedure by doing all the resection on the posterior aspect of the renal pelvis. It was found that the modification accomplished the desired result in less time and with less difficulty than the originally described procedure. Nephrostomy was done by the Cabot-Holland method, the ureteropelvic junction being splinted by a ureteral catheter brought out through the nephrostomy tube. Operation was completed by nephropexy. The patient recovered well, the renal function improved, and the drainage from the kidney was satisfactory (Fig. 6, b). However, the pyelonephritis persisted (as Hinman warns it will do when one kidney is badly damaged and the other normal) and nephrectomy was finally done in November, 1934, with complete relief of symptoms and complete clearing of the urine. At nephrectomy, the right kidney cortex was badly infected, but drainage from the renal pelvis was not obstructed.

References

1. Cabot, H., and Holland, W. W.: Nephrostomy: indications and technic. *Surg., Gynec. and Obstet.*, 54:817, (May) 1932.
2. Hinman, F.: In *Dean Lewis' Practice of Surgery*, VIII: 8:73.
3. Quinby, W. C.: Factors influencing the operative procedure in hydronephrosis. *Jour. A. M. A.*, 93:1706, (Nov. 30) 1929.
4. Schwyzer, A. F.: New pyelo-ureteral plastic for hydronephrosis. *Surg. Clinics No. Am.*, 3:1441-1448, (Oct.) 1923.
5. Sweetser, T. H.: Case report: Horseshoe kidney with complications. *Minn. Med.*, 18:61, (Jan.) 1935.
6. von Lichtenberg, A.: Plastic surgery of renal pelvis and ureter. *Jour. A. M. A.*, 93:1706, Nov. 30, 1929.
7. Walters, W., and Braasch, W. F.: Urinary obstruction and hydronephrosis. *Jour. A. M. A.*, 93:1710, (Nov. 30) 1929.
8. Young, H. H.: Obstruction to the ureter produced by aberrant blood vessels. A plastic repair without ligation of vessels or transplantation of ureters. *Surg., Gynec. and Obstet.*, 54:26, (Jan.) 1932.

ADVANCES IN GENERAL ANESTHESIA*

RALPH M. TOVELL, M.D.

Rochester, Minnesota

GENERAL anesthesia may be produced by the inhalation of any one of several anesthetic agents; for example, nitrous oxide, ethylene, acetylene, cyclopropane, or ether. Oxygen must be supplied for two purposes: first, to carry on metabolism, and thus support life; second, to dilute the toxic concentration of the anesthetic agent to one which will produce sur-

gical anesthesia. With nitrous oxide, little more than enough oxygen to prevent asphyxia may be administered without interfering with the depth of anesthesia. When a more potent agent like ethylene or acetylene is employed, more oxygen than is required to support life must be supplied to dilute the anesthetic gas and thus prevent the development of too profound anesthesia. Therefore, in order to maintain anesthesia, the patient must breathe a mixture that contains the anes-

*From the Section on Anesthesia, The Mayo Clinic, Rochester, Minnesota.

thetic agent, enough oxygen to maintain life, and enough extra oxygen to dilute the anesthetic agent properly. The depth of anesthesia may be governed by varying the percentage of oxygen in the mixture.

With the desired depth of anesthesia estab-

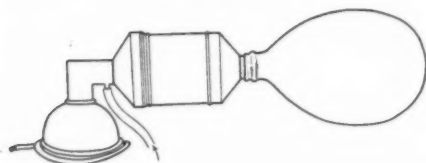


Fig. 1. Carbon dioxide absorption system of the to-and-fro type (Waters).

lished, it would be possible to maintain this stage of anesthesia by having the patient breathe the same mixture over and over again, were it not for the development of anoxemia, and the accumulation of the carbon dioxide exhaled by the patient. The anoxemia might be prevented by adding sufficient oxygen to maintain metabolic function but the patient's condition would still be unsatisfactory because of the labored breathing that is stimulated by the presence of the excess of carbon dioxide. With the older methods of administration, this carbon dioxide which accumulated was allowed to escape, but in order to create a satisfactory escape, a continuous flow of the anesthetic gas from the gas machine, and sufficient oxygen to dilute it, was necessary. This constant wasting of gases for the purpose of carrying off the accumulated carbon dioxide entailed considerable expense. New gas machines were devised and methods of administration were modified, with the object of reducing this expense. Intermittent flow machines, which would automatically shut off the flow of new gases during exhalation, were introduced. Fractional rebreathing permitted a further reduction in cost per hour of anesthesia.

During the usual administration, the gases pass from the supply tanks, which are attached to the gas machine, to the mixing chamber. From the mixing chamber, the gases pass to the rebreathing bag and thence through a flexible tube of large caliber to the face mask. If the rate of flow of gases into the mixing chamber is equal to the patient's minute respiratory volume, the patient's breathing will be very quiet because no carbon dioxide will be inhaled; the flow of gases will be large and the cost of anesthesia great.

If the minute volume flow from the machine is half the minute respiratory volume, half of each exhalation will remain in the mask, delivery tube, and rebreathing bag, and fractional rebreathing will be possible. The minute volume flow might be further reduced in relation to the minute



Fig. 2. Position of the patient when the mask of the absorption system is applied to the face.

respiratory volume but there is a limit beyond which gases cannot be conserved in this manner. A flow of anesthetic gas and oxygen in the proper percentage to maintain the desired level of anesthesia must be constantly maintained to act as a vehicle in which the excess carbon dioxide may escape through the exhaling valve.

It remained for Jackson to devise a method whereby the excess of carbon dioxide was removed by chemical means. He found that soda lime (sodium and calcium hydrate), which he introduced into the rebreathing system, would remove the carbon dioxide. Waters was the first to apply this method in clinical practice. Gas machines that are adapted to this method are now on the market. Two types of apparatus are advocated. One is known as the to-and-fro type and the other is of the circuit type. Either type may be attached to a gas machine which is capable of providing a steady flow of oxygen at rates as low as 200 c.c. per minute.

In the to-and-fro type (Fig. 1), the canister, which contains 500 gm. of Wilson's soda lime of 4 to 8 mesh, is interposed between the rebreathing bag and the mask. With each respiratory cycle, the gases pass through the soda lime twice. The canister is made with a slip joint at each end. It may be removed from the system during induction of anesthesia or when one

wishes to stimulate deep respiration by allowing carbon dioxide to accumulate. One canister of soda lime is sufficient for six to ten hours of anesthesia. A rubber hose carries fresh gases from the machine into the rebreathing system, through a connection which opens immediately

tomed. The exhaling valve should be opened and the gases should be expressed from the rebreathing bag in order to flush out the nitrogen which was in the patient's respiratory tract. The mask should then be fitted very snugly to the face and fastened with a retaining strap. If

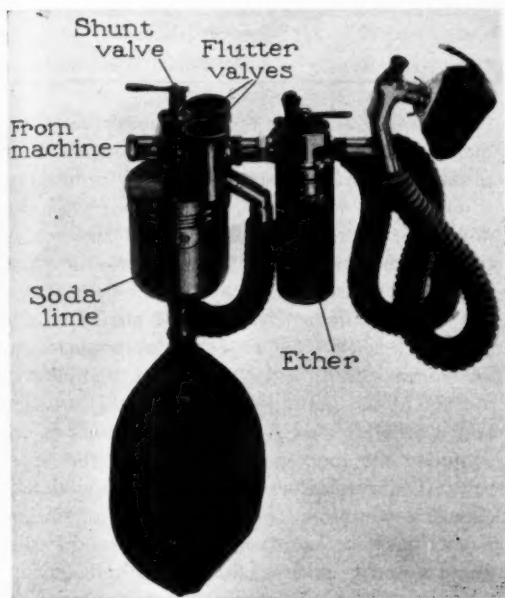


Fig. 3. Carbon dioxide absorption system of the circuit type.

above the mask. Figure 2 indicates the position of the patient and rebreathing system during the administration of an anesthetic.

With the circuit type of apparatus (Fig. 3), the canister is attached to the gas machine and is connected to the mask by two rubber tubes of large caliber. The rebreathing bag is attached to the lower end of the canister. By means of valves, the direction of flow of the gases may be controlled. On inspiration, the flow is directed from the rebreathing bag to the patient, and on exhalation, the gases are directed through the soda lime on their way to the rebreathing bag. Thus, a circuit is established. By means of a shunt valve, the anesthetist can cut the soda lime out of the circuit at will. A schematic drawing of the circuit is shown in Figure 4. The operation of the circuit apparatus is similar in basic principle to that of the to-and-fro type.

For induction of anesthesia, the mask is placed over the patient's face while the gases are flowing at the rate to which the anesthetist is accus-

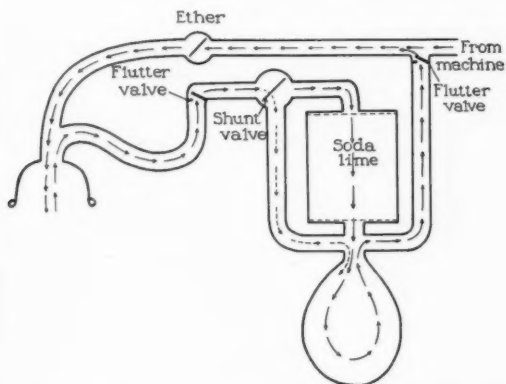


Fig. 4. Carbon dioxide absorption system of the circuit type (schematic).

this tends to make respiration difficult, it is best to slip in an artificial airway and then restrap the mask over the face. When respirations are regular and fairly deep, and as the desired plane of anesthesia is approached, the anesthetist may change to the carbon dioxide absorption technic. The position of the shunt valve is changed to direct the gases through the soda lime; the escape valve is closed; the flow of anesthetic gases is discontinued; and the flow of oxygen is reduced to between 200 and 400 c.c. each minute. If all connections are tight and if the flow of oxygen exactly meets the patient's requirements, no further adjustment should be necessary and no further flow of anesthetic gases should be needed to maintain anesthesia throughout the operation. If the anesthetist is unable to maintain the system leak-free, the breathing bag will deflate but there will be little change in the depth of anesthesia. A slow flow of the anesthetic gas may be necessary to compensate for the escape. In this case, it will be necessary to add sufficient oxygen to dilute this new gas in order to retain the desired level of anesthesia. If the anesthetist fails to provide sufficient oxygen to satisfy the patient's metabolic requirement, the diluting oxygen in the system will be depleted, the rebreathing bag will slowly deflate, the plane of anesthesia will be deepened, and cyanosis will de-

GENERAL ANESTHESIA—TOVELL

TABLE I. FLAMMABILITY LIMITS, PER CENT BY VOLUME

Anesthetic	Atmosphere	Lower	Upper	Authority
Ether	Air	1.3	25.9	Jones and Kennedy
Ethylene	Air	3.0	28.6	Jones and Kennedy
Cyclopropane	Air	3.0	8.5	Buchman and Wardell
Ether	Oxygen	1.7	39.5	Jorissen and Ongkiehong
Ethylene	Oxygen	3.1	79.9	Jones and Kennedy
Cyclopropane	Oxygen	2.5	50.0	Buchman and Wardell

velop. The diluting oxygen should be increased immediately by a temporary rapid flow of oxygen. The untoward condition may be prevented from occurring again by increasing slightly the steady flow of oxygen. This change must be slight; otherwise, the flow will more than meet the metabolic requirements of the patient, the bag will gradually distend, and the depth of anesthesia will be decreased. With these circumstances presenting, the exhaling valve should be opened momentarily and the excess volume of gases should be allowed to escape. A brief but rapid flow of anesthetic gas should be turned on to reestablish the proper anesthetic mixture, and the flow of oxygen should be slightly reduced. When the soda lime becomes exhausted, carbon dioxide accumulates and causes a gradual increase in the depth of respiration. If the anesthetist flushes out the carbon dioxide by the addition of fresh gases and, as a result, the patient's breathing becomes quiet, proof is thus supplied that exhaustion of the soda lime has occurred. With the to-and-fro type of apparatus, the canister may be changed but with the circuit type of apparatus, unless the canister is of the double chamber type, it will be necessary to complete the operation with the gases constantly flowing and shunted around the canister.

Advantages of the Carbon Dioxide Absorption Method

Breathing is usually quiet. The patient's energy is conserved and the surgeon finds exposure facilitated. It is better to produce quiet breathing by removing carbon dioxide, the natural stimulus to deep respiration, rather than by partially paralyzing the respiratory center with ether. The exhaled gases are at body temperature and are saturated with moisture. Re-inhalation of warm gases conserves the patient's body heat and, because the gases are moist, the hazard of explosion from static electricity is re-

duced. Because less gas escapes with this method than with any other, the danger of explosions from external sources is reduced to a minimum. Reduction in danger of explosion does not constitute an excuse for any relaxation of precautionary measures employed to prevent explosions. The use of open flames, high frequency equipment or cautery should not be permitted when ethylene or cyclopropane is being administered, and the relative humidity of the air in the operating room should be maintained at a high level. The warm gases do not stimulate the mucous membranes of the upper part of the respiratory tract to the production of excessive secretion. For this reason, an efficient airway may be maintained with less difficulty than formerly, and less ether is required to maintain anesthesia. Vomiting after operation is minimal and this is probably because less ether-laden secretion reaches the stomach. The volume of gases which is used when the carbon dioxide absorber method is employed, is considerably less than when the constant flow method is used. The possible saving is great and the use of gas anesthesia may now be extended to individuals to whom it was formerly economically impossible to administer gases. The carbon dioxide absorption method has made possible the use of the new and more expensive gas, cyclopropane.

Cyclopropane

The anesthetic properties of cyclopropane were discovered and reported by Lucas and Henderson of Toronto, Canada, in 1929. Its first extensive clinical application was by Waters and Schmidt. Since the gas is represented by a closed ring formula it is probably rather inert. It is a colorless gas, which is heavier than air, and which has a rather sweet odor. Cyclopropane is explosive when its concentration in air exceeds 3 per cent by volume. Its upper limit of inflammability in air is reached when the concentra-

tion is 8.5 per cent by volume. The limits of inflammability of cyclopropane in oxygen are from 2.5 per cent to 50 per cent by volume. Limits of inflammability of other anesthetic agents are outlined in Table I. In clinical practice^{1,2,4,6} the volume of cyclopropane in oxygen seldom need exceed 20 per cent. The same precautions, therefore, must be taken to prevent an explosion of cyclopropane as would be taken to prevent an explosion of ethylene. Because the gas is expensive, it is necessary to employ the carbon dioxide absorption method of administration in order to bring the cost within reasonable limits. In my experience, a tank containing 50 gallons of gas and costing \$25.00 has provided for thirty-four hours of anesthesia.

Induction of anesthesia with cyclopropane is rapid and the patient does not exhibit a period of excitement. Production of mucus is not a factor. Stridor does not seem to be a prominent feature. Cyanosis does not occur unless mechanical obstruction is present. The lid reflex quickly becomes inactive.

As light surgical anesthesia is reached, movement of the eyeball ceases. Respiration is quiet and inhalation is shallow when anesthesia is profound. Blood pressure does not seem to be unduly disturbed. As deep surgical anesthesia is approached, evidence of respiratory depression may be observed and apnea may occur without the appearance of cyanosis. The degree of relaxation approaches that produced by ether and is better than that produced by ethylene. Where relaxation is not adequate, addition of a minimal amount of ether vapor will produce it. This is preferable further to increase of the concentration of cyclopropane, which may be associated with the development of an irregular pulse rate.

Recovery is rapid and is usually accompanied by little nausea. Vomiting during the first post-operative day is not excessive and is less than that which usually is encountered when ether has been used. Headache of moderate degree has been encountered in a few instances. Pulmonary complications occur less frequently after cyclopropane has been used than they do following the administration of ether.

Cyclopropane shows promise of displacing ethylene, at least for certain types of operation. It is particularly valuable when relaxation is needed in cases in which ether is contraindicated

because of some condition within the respiratory system. The gas is useful in cases in which patients are suffering from severe cardiac damage; in these cases, it is advisable that a period of excitement with struggling be avoided. Cyclopropane produces satisfactory anesthesia for surgical procedures involving structures within the thorax. Patients undergoing operations for chronic empyema or for removal of intrathoracic tumors have restricted breathing capacity. The high concentration of oxygen, which may be given with cyclopropane, insures adequate oxygenation. It is because of this factor that cyclopropane also is advised for operative obstetric procedures. Cesarean section may be undertaken with this type of anesthesia. Relaxation is adequate, the baby receives plenty of oxygen, the uterus contracts readily after the placenta has been removed, and hemorrhage is not excessive.

The place cyclopropane will occupy in the list of anesthetic agents is not known. The problem is for the chemist to find an inexpensive method of producing the gas in pure form on a commercial scale. The gas represents an improvement over ethylene in that it is less explosive and it is capable of producing more profound relaxation without the development of cyanosis. Its properties seem to offer the possibility of widespread application of cyclopropane in both operating and delivery rooms.

Intratracheal Anesthesia

There is one essential which must be maintained during the administration of anesthetic agents, particularly when the carbon dioxide absorption method is employed. This is the maintenance of an efficient airway. Simple methods may be employed for this purpose.^{7,8} The jaws should be held forward, or, if necessary an artificial airway may be inserted to hold up the tongue. The most efficient method of establishing an airway is to insert an intratracheal tube. Tubes of several types are available, but in my experience a Magill tube has proved most useful. A Magill tube is prepared from ordinary connector rubber tubing. For the average adult a tube which has an inside diameter of 1 cm. (2/5 of an inch), and which is 26 cm. (about 10 inches) long, is cut and steamed into a curve (Fig. 5). The bevel on the tracheal end of the tube is cut in the anteroposterior plane to facilitate its introduction between the vocal cords.

The catheter may be introduced by way of the nose or mouth. The curve makes it feasible to introduce the catheter by the nasal route and pass it into the trachea without the aid of a laryngoscope, in approximately 70 per cent of

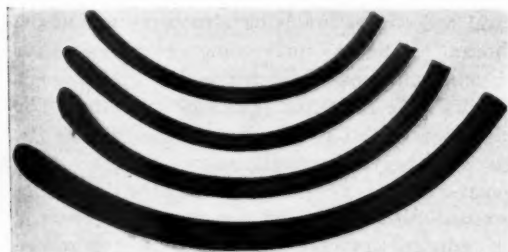


Fig. 5. Intratracheal catheters, Magill type, of several sizes, showing the curve and the beveled tracheal end.

cases. In case of difficulty, a laryngoscope may be introduced. The glottis can then be visualized and the tube may be guided into the opening with the aid of the blade. Intubation through the mouth, with the aid of a laryngoscope, is easy to accomplish provided relaxation is satisfactory.

Immediately after a tube has been inserted into the trachea, it is fixed in position by means of adhesive tape. Anesthesia may be continued by the open drop method or gases may be administered by placing a mask over the patient's face (Figs. 6 and 7). For operations involving the head, face, or neck, it may be advantageous to deliver the gases into the intratracheal tube by means of a direct connection (Fig. 8). The operative field is not encroached on by the face mask, if this method is employed.

General advantages and application of the intratracheal method.—Insertion of an intratracheal tube insures an adequate airway throughout the operation. The method permits constant control of depth of anesthesia, and the surgical stage can be maintained with minimal amounts of ether, nitrous oxide, ethylene, or cyclopropane. The method is warranted for operations on the spinal cord or cerebellum, because the operative risk may be great and the prone position makes aëration difficult with other methods. Oxygen under pressure may be delivered directly into the catheter and artificial respiration may be instituted without the danger of gastric distention. For operations involving structures within the thorax, the method provides for complete control of intrapulmonary pressure. The

exposed lung may be allowed to collapse or may be distended at will. For surgical procedures within the upper abdomen, adequate relaxation can be produced by the intratracheal administration of gases and ether. Quiet, unobstructed res-

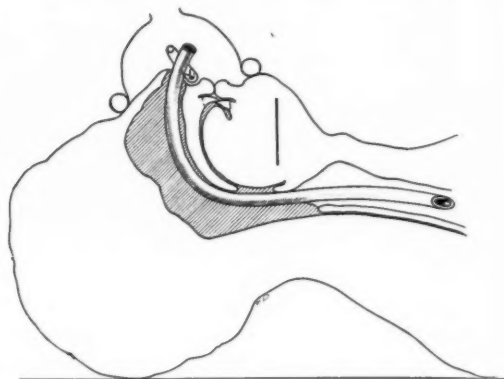


Fig. 6. The intratracheal catheter, introduced through the nose, is transfixed with a safety pin in order to prevent the tube disappearing within the nostril.

piration facilitates exposure. The intratracheal method of administering anesthetic agents is adaptable to many purposes. It is a method which an anesthetist should be prepared to employ should an emergency necessitate it.

Intravenous Administration of Barbiturates

An alternative method to intratracheal anesthesia has recently been gaining in popularity for short operations, particularly about the head and neck. I refer to the intravenous administration of recently discovered derivatives within the barbituric acid series.^{6,12}

The barbiturates, sodium amytal and pentobarbital sodium, have been available for intravenous injection for some years, but have not gained wide acceptance as useful anesthetic agents because the relaxation which they have produced has not been adequate, and because recovery of consciousness has been delayed and frequently has been associated with marked restlessness. Within recent years, search for a short-acting barbiturate has proved successful. One of the new derivatives to be given clinical trial in this country is sodium n-methyl-cyclohexenyl methyl malonyl urea (evipal soluble). Another, sodium ethyl 1-methyl butyl thiobarbituric acid, not yet on the market, is designated by the company as number 8064 or pentothal sodium, and contains a

sulphur radical. It is considerably more potent than is the former drug. Both drugs are supplied in crystalline form in ampules, along with companion ampules containing 10 c.c. of sterile distilled water. One gram of either drug is dis-

speaking, the maximal dose. Consciousness is usually regained in from ten to fifteen minutes after administration of an average dose. The patient can talk at this time but he will be sleepy and will remain quiet if undisturbed.

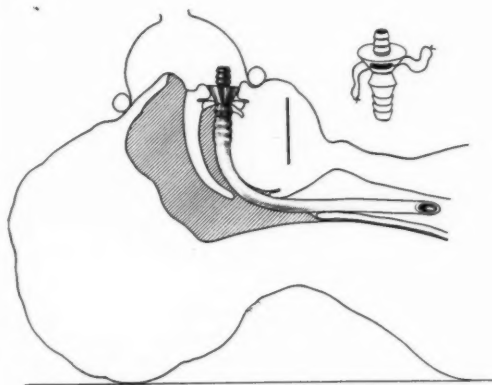


Fig. 7. Constriction of the intratracheal catheter is prevented by inserting a metal piece between the patient's upper and lower incisor teeth.

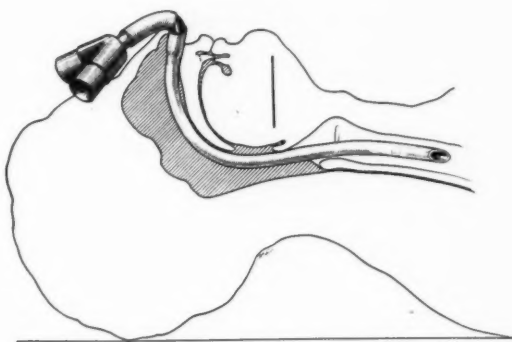


Fig. 8. Intratracheal catheter is directly connected to the gas machine by means of connectors and a catheter adapter.

solved in 10 c.c. of distilled water, in preparation for intravenous injection.

The patient is usually given $1\frac{1}{2}$ grains (0.097 gm.) of pentobarbital sodium one hour before the time set for operation, and morphine, grain $\frac{1}{8}$ (0.01 gm.) with atropine sulphate, grain $\frac{1}{150}$ (0.0004 gm.) are administered subcutaneously a half hour later. The patient is brought to the operating room and the operative field is prepared and draped. An arm is also prepared for intravenous administration of the barbiturate. Fresh 10 per cent solution of sodium ethyl 1-methyl butyl thiobarbituric acid may be injected at the rate of 1 c.c. in fifteen seconds while unconsciousness is being produced. Usually, not more than 2 or 3 c.c. are needed to produce this effect. Injection is then halted until the patient shows some evidence of reaction. Injection is then resumed; a small amount, 0.5 c.c., is administered intermittently throughout the operation, to maintain anesthesia at the desired level. The dose is regulated entirely by the effect produced and is not calculated on a basis of milligrams per kilogram of body weight.

The majority of patients are asleep in one minute. The operation may be begun shortly after unconsciousness is obtained. One gram of pentothal sodium in 10 c.c. of water is, generally

Like other barbiturates, pentothal sodium is capable of depressing the respiratory center. Too rapid administration will produce temporary respiratory arrest. The drug is very rapidly destroyed in the body and three or four thrusts over the lower ribs usually will be sufficient to produce aëration. Should the condition persist, administration of oxygen, 90 per cent, and carbon dioxide, 10 per cent, under pressure, will relieve any cyanosis and maintain the patient's metabolism until the drug is detoxicated.

Pentothal sodium has proved satisfactory for short operations such as incision of abscesses, extraction of one or two teeth, enucleation of an eye, puncture of an eardrum, cystoscopic examination, or for the application of dressings to painful wounds. It is not indicated when relaxation of abdominal muscles is essential. Neither pentothal sodium nor evipal soluble, unlike sodium amytal or pentobarbital sodium, can be regarded as basal narcotics. Their action is so fleeting that they cannot be employed to produce prolonged sleep prior to operation. Both drugs, but particularly pentothal sodium, produce satisfactory anesthesia for minor surgical procedures or for short operations during which slight reflex movement will not interfere with progress of the procedure.

Bibliography

1. Buchman, M. A.: Safeguarding the use of inflammable anesthetics. Reprint No. 81, The Ohio Chemical Manufacturing Company.
2. Jackson, D. E.: The pharmacological action of nitrous oxide. *Jour. Lab. and Clin. Med.*, 1:644-661, (June) 1916.
3. Jones, G. W., and Kennedy, R. E.: Extinction of ethylene flames by carbon dioxide and nitrogen. *Current Res. Anesth. and Anal.*, 9:6-11, (Jan.-Feb.) 1930.
4. Jorissen, W. P., and Ongkiehong, B. L.: Regions of reactions. XI. Explosion regions nitrous oxide-ether vapor oxygen and nitrous oxide-ether vapor-air. *Rec. Trav. Chim.*, 45:633-637, 1926.
5. Lucas, G. H. W., and Henderson, V. E.: A new anesthetic gas: cyclopropane. *Can. Med. Assn. Jour.*, 21:173-175, (Aug.) 1929.
6. Lundy, J. S.: Intravenous anesthesia: preliminary report of the use of two new thiobarbiturates. *Proc. Staff Meetings of Mayo Clinic*, 10:536-543, (Aug. 21) 1935.
7. Magill, I. W.: Endotracheal anesthesia. *Proc. Roy. Soc. Med., Section of Anesthetics*, 22:83-88, (Nov. 2) 1928.
8. Tovell, R. M.: Intratracheal anesthesia. *Current Res. Anesth. and Anal.*, 10:97-103, (May-June) 1931.
9. Wardell, C. H., Jr.: Minimizing the fire and explosion hazard of anesthetic agents. *Hosp. Prog.*, 9:384-386, (Sept.) 1928.
10. Waters, R. M.: Clinical scope and utility of carbon dioxide filtration in inhalation anesthesia. *Current Res. Anesth. and Anal.*, 3:20-22, (Feb.) 1924.
11. Waters, R. M., and Schmidt, E. R.: Cyclopropane anesthesia. *Jour. Am. Med. Assn.*, 103:975-983, (Sept. 29) 1934.
12. Weese, H., and Scharpf, W.: Evipan, ein neuartiges Schlafmittel. *Deutsch. med. Wchnschr.*, 2:1205-1207, (July 29) 1932.

POSTPARTUM HEMORRHAGE*

JOHN A. URNER, M.D., Ph.D.

Associate Professor of Obstetrics and Gynecology, The University of Minnesota
Minneapolis

THE consideration of postpartum hemorrhage as a serious complication of labor and the puerperium becomes obvious when one studies the recently published figures of the United States Department of Labor on maternal deaths. These figures show that about 5 per cent of maternal deaths are due to postpartum hemorrhage, excluding hemorrhage caused by placenta previa and premature separation of the placenta. The statistics from the State of Minnesota will show about this same incidence.

It must be admitted that these figures are too high, and that much can be done to reduce maternal deaths from this cause by the application of a few well accepted principles based upon the anatomical and physiological characteristics of the puerperal uterus.

The commonly accepted causes of postpartum hemorrhage in the order of frequency are:

1. The improper conduct of the third stage of labor.
2. The atonic uterus.
3. Lacerations of the cervix uteri and the birth canal.
4. Retained secundines.

The proper conduct of the third stage of labor depends upon a full appreciation of the anatomy and physiology of the puerperal uterus and placenta and the mechanism of separation of the placenta and membranes from the uterine wall. A

review of this stage of labor seems necessary at this time.

Immediately after the birth of the baby, the uterus contracts so that the fundus lies several centimeters below the umbilicus. At this time there is beginning retroplacental bleeding which forms a lake of blood between the placenta and the uterine wall, and as the blood accumulates it raises the placenta from its attachment to the uterus and permits it to fall into the lower uterine segment. With a normally acting uterus, there is little if any bleeding during this stage. The evidence of separation of the placenta is the secondary rise in the height of the uterus, further protrusion of the umbilical cord from the vagina, and a slight increase in external bleeding. When these signs become evident, the accepted procedure is to express the placenta manually.

With this physiologic process of placenta separation in mind, the management of the third stage of labor logically follows.

The procedure we have adopted at the Minneapolis General Hospital consists in giving one cubic centimeter obstetrical of pituitrin intramuscularly immediately after the baby is delivered, provided the patient has shown no signs of toxemia or does not have a systolic blood pressure in excess of 150 mm. of mercury. The hand is placed upon the lower abdomen to determine the state of uterine contraction. If bleeding is moderate or severe, only firm pressure is made. Vigorous massage is purposely avoided at all times. If an episiotomy or laceration is

*From the Department of Obstetrics and Gynecology of the University of Minnesota and the General Hospital, Minneapolis. Read before the meeting of the Southern Minnesota Medical Association, Austin, Minnesota, August 26, 1935.

to be repaired, it is done before the placenta is expressed. This is a good procedure, as it keeps one otherwise occupied rather than making an effort to express the placenta before it has separated. When the uterus shows signs of placental separation, the placenta is expressed though it occurs during the time the repair is made. Following placental delivery, one cubic centimeter of ergot is given intramuscularly, and an ice bag is placed on the lower abdomen, to further aid uterine contraction.

We have found the foregoing method very satisfactory, as during the past five years, in 7,547 patients delivered, there were no deaths from this cause and the following measured blood losses were obtained:

50-100 cubic centimeters.....	3549	48.3%
1-200 cubic centimeters.....	1984	26.2%
2-300 cubic centimeters.....	936	12.4%
3-400 cubic centimeters.....	482	6.3%
4-500 cubic centimeters.....	233	3.08%
5-600 cubic centimeters.....	126	1.67%
6-700 cubic centimeters.....	70	.92%
7-800 cubic centimeters.....	45	.59%
8-900 cubic centimeters.....	28	.37%
9-1000 cubic centimeters.....	16	.21%
1000 plus cubic centimeters.....	99	1.31%
No record	41	.54%

We believe that the pituitrin plays an important part for two reasons. First, it keeps the uterus in contraction, producing a constriction of the retroplacental vessels, and, secondly, it shortens the third stage of labor to an average of three minutes, about one-third of the usual duration. Statistically, there seems to be a correlation between the duration of the third stage of labor and the amount of blood lost. This relationship seems to be a direct proportion between the amount of blood lost and the time the placenta is retained.

The question arises as to the pituitrin producing hour-glass contraction and retention of the placenta. We believe this objection is theoretical, as this condition has not occurred with any greater frequency than in a similar group of patients where no pituitrin was used after the first stage of labor.

Massage of the uterus tends to cause an abnormal condition, especially if a partial separation of the placenta is present, which prevents the formation of a retroplacental lake of blood, interferes with normal separation and favors retention of the placenta. Thus it seems much safer to dispense with uterine massage, and to make only firm pressure and aortic compression

in patients who have poor uterine action and who continue to bleed.

The mechanism of separation of the placenta, whether that of Schultz or Duncan, has an influence upon the amount of bleeding. Statistical studies show that the Duncan mechanism predisposes to a greater blood loss. The recognition of this mechanism is of clinical importance. Generally, in the absence of severe cervical or vaginal lacerations, the placenta separating by this mechanism will show slow continuous bleeding, the amount of which will vary in the individual patient. Constant vigilance is necessary, and if the bleeding becomes alarming Credé expression is necessary. If the uterus can be maintained in tonic contraction by its own irritability or augmented by pituitrin, the bleeding from this method of separation can be greatly reduced.

The expression of blood clots from the uterus one hour after delivery is an excellent means of preventing further bleeding. This empties the uterus and restores its irritability efficiently.

The atonic uterus often leads to the most severe and profuse postpartum hemorrhage. This type of uterus is associated with primary and secondary inertia, in which there is greatly diminished or total lack of contractile power of the uterus. Multiple pregnancy and hydramnios which lead to excessive uterine distention, and excessively large babies, malpresentation and pelvic contractions which predispose to long hard labors leading to the depletion of uterine energy, result in exhaustion and often complete failure of contractile power.

The prophylactic consideration of atony of the uterus is of the greatest importance. The diagnosis is made by the character of the uterine contractions, which are infrequent, short in duration and inefficient. There is often severe subjective pain, and if the hand is not placed on the abdomen and the character of the contractions determined, one will often be misled as to the actual condition.

Successful treatment is carried out by rest and high caloric food intake to allow repletion of uterine energy. Stimulation may be necessary after a rest period. In short, it is necessary to nurse the uterus along until spontaneous delivery occurs or operative delivery is advisable. It must always be remembered, that the uterus must have contractile power following delivery, in

order to avoid serious blood loss. Forceps or version are formidable procedures when the uterus is inert and should not be done unless the uterus can be felt to have some contractile power.

Lacerations of the cervix uteri and birth canal are frequently seen in very rapid spontaneous delivery, and following operative procedures as manual dilatation of the cervix, forceps deliveries, and version. Depending upon the extent of the injury, the bleeding will vary greatly in amount. Attention is called to bleeding from this cause when there is a continuous blood loss in spite of a well contracted uterus. In such instance, the accepted form of treatment is exposure of the cervix and birth canal and ligation of the bleeding vessels.

Retention of portions of the placenta or membranes occasionally gives rise to serious hemorrhage. Large portions often interfere with uterine contractions and result in continuous bleeding. Inspection of the placenta and membranes will enable one to estimate the amount of retained tissue, which if large in amount and producing severe bleeding must be removed manually. Small amounts of tissue which are retained with no bleeding can usually be left alone to be passed later with the lochia.

We must always keep in mind, in the face of alarming hemorrhage, the treatment of shock which so often occurs. This consists of elevation of the foot of the bed, stimulants, intravenous saline, glucose or gum acacia in the order

of their accessibility, and, finally, transfusion of whole or citrated blood, the most effective of all recognized procedures to replace blood loss and maintain the patient's resistance throughout her lying-in period.

Summary and Conclusion

Postpartum hemorrhage is a frequent cause of maternal death. The careful conduct of the third stage of labor, the avoidance of uterine manipulation and the intelligent use of oxytocic drugs will reduce the amount of bleeding following the delivery.

The expression of blood clots one hour after delivery will reduce the amount of blood lost early in the puerperium.

The atonic uterus is most dangerous from the standpoint of hemorrhage. Rest, stimulation and repletion of its energy by means of oxytocic drugs are prophylactic safeguards for this condition.

Birth injury of the cervix uteri and birth canal may lead to alarming hemorrhage. They should be recognized early and treated by ligation of bleeding vessels and repair.

Inspection of the placenta and membranes is necessary. Large retained portions leading to continuous bleeding should be removed manually.

In all cases of alarming hemorrhage all preparation should be made for the treatment of shock, the most effective method being transfusion of whole or citrated blood.

More Nostrums in Retrospect

The Bureau of Investigation submits the following brief statements regarding products that have previously been dealt with in more detail in *The Journal*: *Laxative Bromo Quinine*.—The A. M. A. Chemical Laboratory analyzed this product in 1915 and reported that each tablet contained as its essential ingredients 2 grains of acetphenetidin, 1/5 grain of caffeine, 2/5 grain of quinine or cinchona alkaloids, with aloes or aloin as a laxative. The 1935 trade package declares—as the law requires—that each Laxative Bromo Quinine tablet contains one grain of acetanilid! *Murine*.—From an analysis made in the A. M. A. Chemical Laboratory in 1908, the chemists concluded that Murine was essentially a water solution of borax (about 12 grains to the fluid ounce) containing a trace of berberine or some golden seal preparation. *Western Medical Corporation*.—The analysis made of the so-called treatment for epilepsy put out by this concern

when it was known as the Western Medical Association, showed its essential ingredient to be phenobarbital (luminal). There were also some so-called digestive tablets and a laxative. *Nurito*.—From an analysis made by the A. M. A. Chemical Laboratory in 1912, Nurito was found to consist of milk sugar, phenolphthalein and amidopyrine (pyramidon). In 1914 federal chemists found both amidopyrine and milk sugar in Nurito, but no statement was made regarding the presence of phenolphthalein. In 1927 a representative of the concern declared that amidopyrine had been removed from Nurito and that the "patent medicine" at that time contained aspirin, phenolphthalein, colchicin salicylate, caffeine and milk sugar. *Min-amin*.—It was brought out in an article published by the Bureau of Investigation in *The Journal*, January 26, 1935, that Min-amin was examined in the A. M. A. Chemical Laboratory and found to be essentially powdered wheat germ.—(*J. A. M. A.*, November 30, 1935, p. 1791.)

CLINICAL PATHOLOGIC SEMINAR*

Conducted by E. T. BELL, M.D.

Department of Pathology, University of Minnesota

Minneapolis

Tularemia

Case 1.—A man, sixty-three years old, was admitted July 23, 1935, at 8 p. m. He was well until the evening of July 22, when he began to feel sick with no localized complaint. Temperature was 103° and he had a mild chill. On the morning of July 23 he was perspiring profusely; temperature 103°; pulse 100. He felt quite ill but had no localized distress. Findings through physical examination were negative. On the afternoon of the same day his condition was the same.

At this time he said that he had found a woodtick between his toes on July 19 and had removed one from his buttock on July 17. He entered the hospital the evening of July 23. Between the fourth and fifth toes on the right foot was a small dark bluish area about 3 mm. in diameter; not a definite ulcer. On the morning of July 25 a definite enlargement of the femoral glands on the right side was noted; these glands were tender on palpation. At this time the lesion between the toes was seen to be a definite ulcer.

The patient was extremely ill from the time of his admission onward. Temperature was continuously high, ranging from 102° to 106° per rectum. Pulse was around 100 to 110. Heart sounds were good until toward the last week of illness, when they became weaker. He was somewhat delirious throughout the whole course of his illness but at times was rational. He had a chill at the beginning of his illness but no more chills until August 6. There were chills on the 6th, 8th, 9th and 10th of August. There was irregular diarrhea with involuntary stools throughout the illness.

Leukocytes ranged from 6,000 to 12,000 with a preponderance of neutrophils. A skin test for tularemia on July 29 gave negative findings. On July 31, however, the skin test was positive. Agglutination test for tularemia was negative on July 26 and July 30, but positive on August 8. On July 31 scrapings from the ulcer between the toes were immersed in saline solution and injected into a guinea pig. The pig died about forty-eight hours later with the anatomic picture of tularemia and the *Bacillus tularensis* was isolated. The patient was given 15 c.c. of Foshay's serum intravenously on July 29 and July 30; 28 c.c. on August 2 and again on August 3.

Urinalysis on admission showed specific gravity 1.032; albumin +; no sugar; very few casts; on eight subsequent urinalyses the same findings were present; albumin from + to ++. Hemoglobin was 86 per cent on admission; 62 per cent on August 12; erythrocytes 4,500,000 on admission. Blood sugar, July 24, was 147 mg.; urea nitrogen 30 mg. on the same date. Three blood cultures on cystin brain broth medium were all negative. Agglutination tests for typhoid, paratyphoid and undulant fever were negative. Agglutination test for *B. tularensis* on July 30 was positive at 1:320. A guinea pig injected intraperitoneally with 5 c.c. of defibrinated blood from the patient, obtained on August 12, died with the anatomic picture of tularemia. During the last week of life physical signs of extensive pneumonia developed. Death occurred August 13, 1935.

The chief postmortem findings are as follows: There

were about 200 c.c. of slightly cloudy fluid in the right pleural cavity; soft adhesions over the base of the right lung; about 50 c.c. of cloudy fluid in the left pleural cavity. The heart weighed 320 grams and showed cloudy swelling of the muscle. The right lung weighed 1,170 grams. There was a very little air in the middle and lower lobes; air was markedly reduced in the upper lobe, and there was fibrinous exudate over the surfaces of the lung. On section the lung showed small grayish consolidated areas which contained pus in the central portions. There was an abundant bloody fluid in other parts of the lung and the bronchi were filled with thick purulent exudate. There were two distinct nodules, 5 mm. and 8 mm. in diameter, in the lower lobe; on section these contained pus in the central portion. The left lung weighed 875 grams and resembled the right. The spleen weighed 350 grams; on section numerous tubercle-like areas from 1 to 2 mm. in diameter were seen.

The liver weighed 2,000 grams. A few small grayish tubercle-like areas about 1 mm. in diameter were seen on section. The kidneys showed cloudy swelling. The mediastinal lymph nodes and the right inguinal nodes were enlarged and on section showed cheesy necrotic foci throughout. The brain showed no gross disease.

Microscopic Examination.—The tubercle-like areas in the lymph nodes, spleen and liver showed either central necrosis or small central abscesses surrounded with a small amount of epithelioid cell reaction. In the lungs were found some focal necroses and small abscesses, such as are found in the spleen, liver and lymph nodes; there was severe necrotizing bronchitis and bronchiolitis and the bronchi were filled with purulent exudate.

Comment.—This is a typical case of tularemia. The diagnosis was clearly established clinically and the pathologic findings are characteristic of tularemia. It is to be noted that animal inoculation is the most satisfactory method of establishing the diagnosis. The skin test for tularemia is negative at first but becomes positive later. Foshay's serum was ineffective in this case, probably because of its great severity.

Aleukemic Myelosis

Case 2.—A man, sixty-three years old, was admitted January 10, 1936. First admission was in January, 1932. Then he was studied for eighteen days and the resulting diagnosis was pernicious anemia. Hemoglobin was 47 per cent; red cells 1,700,000; white cells 6,500. Morphologic study of the blood showed anisocytosis, macrocytosis, poikilocytosis and polychromasia with occasional nucleated red cells; neutrophils showed "toxic" changes. Liver and spleen were not palpable. There was numbness and tingling of hands and feet, with decreased vibratory sensation in the legs. There was no free gastric HCl. The patient improved markedly on liver therapy and was discharged with hemoglobin of 77 per cent and red count of 2,800,000.

He was re-admitted November 2, 1935. He had continued the liver treatment during the intervening three years. Hemoglobin was 59 per cent; red cells 2,500,000. The blood picture was much the same as

*This is the first of a series of cases to be published each month in MINNESOTA MEDICINE, under the heading "Clinical Pathologic Seminar." The cases presented will be selected by Dr. Bell as the most instructive among those discussed at the weekly pathologic conference held at the University of Minnesota under his direction.

in 1932. The liver now was palpable at 3 cm. above the umbilicus. Possibility that there might be a primary disease of the liver with associated abnormal destruction of red blood cells was considered. Stool urobilinogen showed 613 mg.; urine showed 8 mg. per twenty-four hours. Icterus index was 20; van den Bergh showed a very faint trace in the immediate reaction; ++ in delayed reaction.

On admission in January, 1936, he had noticed a gradual enlargement of the abdomen until two months previously; since then there had been rapid enlargement. Temperature was 99°; pulse 95; respirations 20; blood pressure 140/80. He was well nourished; dyspneic on mild exertion; mucous membranes showed peculiar yellowish tinge; neck and thorax normal; mild edema of legs; icteric tinge of conjunctivae. The abdomen was very large; suggestion of free abdominal fluid; liver extended into lumbar region on left and below the umbilicus; 3 cm. to the right of the midline the liver was just above the umbilicus; a large mass, 5 cm. in diameter and 1 cm. in thickness, was felt projecting from right lobe.

Urine had a specific gravity of 1.022; trace of albumin; no sugar; two to four pus cells found; bilirubin never found in urine; + to ++++ urobilin and urobilinogen constantly present.

Hemoglobin was 63 per cent; erythrocytes 3,000,000; leukocytes 11,100; polymorphonuclears 66.5 per cent; lymphocytes 18.6 per cent; monocytes 7.3 per cent; eosinophils 7.6 per cent on a 300 cell differential count; 6,000 reticulocytes. Morphologic study showed mild anisocytosis with many cells appearing larger than normal and a few true macrocytes; moderate polychromasia; slight poikilocytosis; occasional nucleated red cells. Leukocytes were toxic; showed slight shift to left; no shift to right; no neutrophils of pernicious anemia found.

Stools showed no occult blood; contained urobilin and urobilinogen in large quantities.

Blood urea nitrogen was 13.4 mg. Icterus index 44; van den Bergh showed ++++ biphasic reaction. Rvitz and Kahn tests gave negative findings. X-rays of the gastro-intestinal tract showed nothing of importance; x-ray of heart showed enlargement of left ventricular type; no evidence of pulmonary disease; electrocardiogram showed a normal condition.

The patient complained of tingling and numbness of hands and feet and sore tongue. There was an absence of free HCl in gastric contents. The following diagnoses were considered: pernicious anemia with associated carcinomatous metastasis to liver or nodular cirrhosis with fatty degeneration; metastatic carcinoma of the liver; carcinoma of the liver with associated pernicious anemia. Temperature usually 99.5° or 100°. Four days before death he began to get weaker, restless and worried about his condition. On January 20 icterus index was 54. Stool urobilinogen 218 mg.; urine urobilinogen 15 mg. per twenty-four hours. On January 21 he became quite listless and slept most of the time. On January 22 he was much weaker, became cyanotic and died. Icterus index was 150.

The chief postmortem findings were as follows: Heart was normal. The lungs showed no important change. The liver weighed 4,500 grams. On the external surface a large number of rounded elevations were noted which were bluish to dark red in color and quite soft. On section the parenchyma was found to be studded with circumscribed soft hemorrhagic areas from 1 mm. to 12 cm. in diameter; these seemed to be composed largely of blood which was of reddish to brownish color; when the clots of blood were removed the walls appeared fairly smooth. These areas were so numerous that they destroyed the larger part of the parenchyma. A gross diagnosis of the lesions in the liver was not made. The gallbladder was normal; the bile ducts were patent. The spleen weighed 400 grams; on section it was grayish red and showed no special markings. The other organs, including the

brain, showed nothing of interest. A very intensive examination was made for primary lesions in the organs outside of the liver but none was found.

Microscopic examination of the lesions in the liver showed these to be for the most part hemorrhages, but in the walls of the hemorrhages and in some of the smaller lesions numerous immature leukocytes of the myeloid series were found; also a large number of erythroblasts. The microscopic examination established the diagnosis of aleukemic myelosis of erythroblastic type.

Comment.—This is an example of aleukemic myelosis which showed a hemolytic type of anemia over a period of years. It is to be noted that the anemia responded to liver treatment although the case was not one of true pernicious anemia. The diagnosis could hardly be established clinically. No accurate idea of the disease was obtained until the liver was examined microscopically.

Chronic Steatorrhea

Case 3.—A white man, forty-three years of age, was first admitted December 18, 1934, complaining of diarrhea, weakness, abdominal pain and gaseous distention and attacks of stiffness involving the upper and lower extremities. He had had some form of spasticity when a child. During childhood he had a diarrhea which lasted about eleven months but ended in spontaneous recovery. He had measles and chickenpox in childhood; influenza with pleurisy in 1918.

In the spring of 1933 he began to have attacks of stiffness in the upper extremities; the attacks would last from a few minutes to three or three days. In one severe attack his hands became stiff and three hours later the arms were flexed at the elbows and the fingers were extended at the phalangeal joints and flexed at the metacarpophalangeal joints. He was taken to a hospital, where he remained for several days, during which time he was given parathormone; this relieved the stiffness. During the winter of 1933-1934 he had another similar severe attack. He was taken to a hospital; parathormone was again administered and the stiffness was relieved. Following this discharge he began to lose weight and felt very weak. In August, 1934, he began to have diarrhea; three or four bowel movements daily; the diarrhea was intermittent at first, being more severe after he had eaten coarse foods. About an hour after eating coarse food he would have pain in the upper abdomen followed by abdominal distention. He usually obtained relief by using enemas. There was no nausea or vomiting associated with these attacks. He continued to have mild attacks of stiffness of the hands. During the attacks the hands felt numb and he was more susceptible to cold.

On admission December 18, 1934, he was somewhat emaciated, pale and anemic in appearance. There were no significant findings in the heart or lungs. Blood pressure was 100/70. At this time there was no abdominal distention and there were no palpable masses in the abdomen. Rectal examination was negative. There was positive Chvostek sign and positive Trousseau. Blood: hemoglobin 72 per cent; white cells 5050; polymorphonuclears 68 per cent; lymphocytes 32 per cent. Urine: trace of albumin; acid reaction; no sugar; occasional leukocytes.

X-ray examination of the stomach and duodenum showed the stomach somewhat hypertonic, but no evidence of intrinsic lesion could be determined. The duodenal bulb filled fairly well and appeared normal. Barium enema showed a markedly dilated sigmoid; remainder of colon was fairly normal. Appendix was visualized and appeared normal. The pelvic bones showed no changes. On December 21 blood calcium was 7.94 mg.; blood phosphorus 4.1 mg.; Kline and Kahn negative. The stools were large, foamy and

bright yellow; no mucus; a little blood; no pus; no parasites.

On December 28, blood calcium was 8.4 mg. On January 4, 1935, blood calcium was 11.2 mg.; blood phosphorus 4.5 mg. During the rest of the month of January the calcium remained at about this level. The patient was on a high protein diet throughout his stay in the hospital. On January 31 he was discharged with instructions to continue on this diet and to return to the outpatient clinic in one month for further observation. He was seen from time to time in the outpatient clinic. He gradually lost weight and strength; had attacks of diarrhea, abdominal pain and distention, sometimes with nausea and vomiting.

On February 2, 1936, he was readmitted to the hospital in a moribund condition. He was markedly dehydrated and emaciated; blood pressure was 86/60; extreme asthenia; slight abdominal distention; tenderness in the upper midabdominal region on palpation; marked irritability of muscles; positive Chvostek sign. Blood calcium was 6.71 mg.; blood phosphorus 8 mg. Stools were positive for occult blood. Hemoglobin was 27 per cent; red cells 1,856,000; white cells 6,100; polymorphonuclears 74 per cent; lymphocytes 26 per cent. He was given supportive measures, among them intravenous glucose and saline and intravenous calcium chlorides. Six hours after admission the patient expired.

The chief postmortem findings were as follows: There was marked emaciation; no edema; palpable mass in the left upper quadrant of the abdomen. The peritoneal cavity showed no ascites; no evidence of peritonitis. There was a tumor in the jejunum about 17 feet from the ileocecal valve which caused almost complete obstruction; the bowel above the tumor was markedly dilated, while below it was collapsed. The lungs and heart showed no disease. The spleen weighed 100 grams and showed no disease. The liver weighed 1900 grams and was of a pale yellowish color. The gallbladder showed no disease.

The tumor of the jejunum was found on microscopic examination to be a carcinoid which had infiltrated the walls and caused almost complete obstruction. There were no important changes in any of the other organs.

Diagnoses included chronic steatorrhea; carcinoid tumor of the jejunum with obstruction.

Comment.—This is a typical case of chronic steatorrhea of idiopathic type. The patient was unable to absorb fatty foods; the fats produced a diarrhea. The continuous diarrhea is the cause of emaciation and also of low blood calcium. Low blood calcium is responsible for the spasticity. Death was due to an unsuspected tumor of the jejunum. In chronic steatorrhea there is usually some hyperplasia of the parathyroid glands, but these were not examined in this case. The disease is also called nontropical sprue.

Syphilitic Aortitis

Case 4.—A white man, aged fifty-nine, was admitted February 11, 1936. He was first seen in the dispensary in September, 1935, at which time his chief complaint was of attacks of precordial pain which radiated down the inner side of both arms to the finger tips, was brought on by exertion and accompanied by dyspnea. These attacks had occurred incessantly over the past five or six years and had been getting progressively more frequent and more severe. Examination revealed a to-and-fro murmur over the aortic area and slight enlargement of the heart to the left. The blood pressure was 160/60. There was a history of one attack of rheumatic fever involving the ankle and knee thirty years ago. A routine blood Wassermann was then

found to be ++++ and the patient was admitted to the hospital.

He admitted having had gonorrhea on two occasions thirteen years ago. He would give no history as to his primary syphilitic infection until on his last admission, at which time he admitted having a chancre twenty or twenty-five years before admission. He said that he had had no secondary manifestations.

Upon admission the pupils reacted to light and accommodation. There were a few râles in the bases of the lungs. The heart showed a diastolic murmur at the apex (in addition to the to-and-fro murmur). Blood pressure was 164/66. Rhythm was regular; pulse rate 80. The reflexes in the lower extremities were absent; there was a questionable Romberg sign.

Blood showed 82 per cent hemoglobin; 6,050 leukocytes; 57 per cent polymorphonuclears, 40 per cent lymphocytes, 1 per cent eosinophils, 2 per cent basophils. Blood Wassermann test was ++++ on two occasions. Urine examination was negative. There was no fever.

Electrocardiogram showed an inverted R wave in lead III and the T wave was flattened in lead III.

X-ray showed the heart to equal 53 per cent with increased prominent left ventricular area. The lungs were normal. There was slight sclerosis of the aorta.

The anginal attacks were treated by nitroglycerin, which gave considerable relief. Antisyphilitic treatment was advised but not begun. The patient was discharged and was followed in the dispensary. His anginal attacks continued to become more frequent. He was admitted on February 11, 1936.

At this time the blood pressure was 152/80 and there were enlarged lymph nodes in the neck. The examination otherwise was exactly similar to that done previously. The white count was 14,500. The patient continued to show congestive râles in the bases of the lungs posteriorly and complained of pain in the calves of the legs. The muscles of the calf were tender to palpation. However, his general condition remained about the same. He died very suddenly at 9:45 p. m., February 16, 1936.

Postmortem examination was made by Dr. John F. Noble. There was no edema; no jaundice; no ascites. There was 100 c.c. of clear fluid in the left pleural cavity; right cavity obliterated by old adhesions. Heart measured 16 cm. transversely; weight 580 grams; there was typical syphilitic aortitis from the aortic ring to the termination of the thoracic aorta, where it dropped off sharply. The leaflets of the aortic valve showed a separation at the commissures and their free margins were thickened and rounded, which produced shortening of the leaflets. The left coronary ostium was about 1 mm. in diameter; the right coronary ostium was completely occluded. There were no scars or areas of softening in the myocardium. There were no mural or valvular thrombi. The left ventricle was hypertrophied and dilated. There was rather marked edema of the lungs and passive congestion of the liver and spleen.

Diagnosis was syphilitic aortitis with narrowing and closure of the coronary ostia and insufficiency of the aortic valve.

Comment.—This case shows two of the classical effects of syphilitic aortitis upon the heart. There is insufficiency of the aortic leaflets from rolling up at their free margins and separation of the leaflets at the commissures. There is also marked reduction of the blood supply of the heart from closure of one coronary ostium and narrowing of the other. The anginal attacks were presumably due largely to the narrowing of the ostia.

CASE REPORTS

SECONDARY PELLAGRA*

JOHN FRANCIS BRIGGS, M.D.

Assistant in Medicine, University of Minnesota

Saint Paul

PELLAGRA is easily recognized in its endemic areas, but in the Northern States the disease is unusual and often goes unrecognized. True pellagra in this area is almost always a concomitant finding in individuals suffering from some other disease. By virtue of this primary disease, dietary indiscretions occur which eventually lead to the appearance of the pellagrous lesions, so that pellagra has been found in association with chronic alcoholism, voluntary starvation, as well as in pathological changes in the gastro-intestinal tract. To review the voluminous literature concerning secondary pellagra, would be repetitious and of no great value. The appearance, however, of two pellagrians within a short period of time as a result of self-restricted diets is worthy of reporting.

Case 1.—Mrs. P. C., white female, aged fifty, was admitted to St. John's Hospital on July 9, 1935. At the time of admission she complained of weakness and pain in the upper right quadrant, and skin trouble. She stated that she had been perfectly well until the age of twenty-five, when she first noticed vague and indefinite abdominal pain. This was not severe until she was twenty-seven years of age, when she underwent an exploratory laparotomy. At this time the appendix was removed and the stomach was sutured into a high plane to overcome a gastropexia. She remained well for three years when the abdominal distress recurred. Upon an ulcer regime the gastric pain disappeared and she enjoyed good health until thirty-eight years of age. At this time she underwent a hemorrhoidectomy and a bilateral herniotomy. At forty years of age her tonsils were removed. At forty-seven years of age she had a recurrence of her epigastric distress, but the pain, this time, was new in character in that it involved the upper right quadrant almost entirely. There was no qualitative or quantitative food relationship. The pain seemed to start in the midline and was always sharp in character with radiation into the right shoulder as well as to the angle of the right scapula. She believed that soda gave occasional relief for this distress. As time went on the frequency of the attacks increased until the past year when on two occasions, acholic stools and jaundice were first noticed by the patient. She consulted a quasi-physician, who told her that she was suffering from achlorhydria. The exhibition of dilute hydrochloric acid did not alter the attacks. Failure to obtain relief forced the patient to self medication. One year before admission to the hospital she placed herself upon a diet consisting entirely of milk and oatmeal. The attacks of epigastric distress decreased in frequency, but she began to lose weight very rapidly. Within a few months she had lost sixty pounds in

weight. Six months ago she developed a very severe eczematous condition of both hands and the dorsum of the forearms. Later the same kind of a lesion appeared on the back of the neck and she noticed that her skin would break out with the same type of a rash when the sunlight struck it. Associated with the skin lesions was a recurring diarrhea. Because of her extremely weakened state, the patient consulted a physician two months before being admitted to the hospital. He placed her upon a well-balanced diet and in addition she was given fruit juices, yeast, viosterol, and dilute hydrochloric acid.

The family history is irrelevant.

Physical examination revealed an extremely emaciated white female who resembled a woman eighty years of age, rather than her stated age of fifty years. The head, eyes, ears, nose and mouth were normal. There were small ulcerative lesions upon the hard palate as well as a few small ulcers on the gum margins. It was quite obvious that these ulcers were healing. Examination of the neck and chest was negative. Examination of the heart was negative. Blood pressure was 128 over 80; pulse 72. On examination of the abdomen there was pain and tenderness over the gallbladder region, and through the very thin abdominal wall the gallbladder was palpable and seemed to be the size of a large pear. Across the lower portion of the abdomen were two herniotomy scars, and in the upper abdomen was the scar of a left rectus incision. Examination of the genital organs and rectum was negative. Hernial rings were negative. Back negative. Examination of the joints, reflexes and extremities showed them to be negative. Proctoscopy was negative. On the back of the neck was a scaling eczematous lesion the size of a dollar. Upon the dorsum of the hands, extending up the dorsum of the forearms to the elbows, was a fading eczematous rash. The skin condition of one arm and hand was a mirror image of the other. The rash was perfectly symmetrical. Pigmentation was still present and in some areas an erythematous blush was still present in the lesions.

Laboratory examination: Urine normal, hemoglobin 65 per cent, red blood cells 3,600,000, white blood cells, 6,500. Basal metabolism, plus five. Wassermann negative. Icteric index 13. Gastric analysis: free hydrochloric acid, 96; combined, 4.

X-ray examination: Chest and gastro-intestinal tract normal. Gallbladder non-functioning and filled with stones. Sella turcica normal.

The electrocardiogram was normal.

Diagnosis: (1) Cholecystitis and cholelithiasis; (2) pellagra associated with emaciation; (3) voluntary starvation; (4) secondary anemia.

Following discharge from the hospital, the patient was referred home for treatment. She was placed on a normal diet. In addition, a high vitamin regime was instituted. Lextron was administered along with extralin. No free hydrochloric acid was given because of the laboratory results. In one month, the skin condition had entirely disappeared, the stomatitis was cured, and the patient had regained ten pounds of her weight. The gallbladder was removed by Dr. Plondke, and the patient made an uneventful convalescence. She is still gaining weight, and to date there has been a steady improvement in her general condition.

Summary: This patient, by voluntary restriction of her diet to relieve gallbladder pain, developed the syndrome of bilateral symmetrical dermatitis, diarrhea,

*From the Medical Service of St. John's Hospital.

CASE REPORTS

and a mild stomatitis. The institution of anti-pellagra treatment brought about a marked improvement and cure in the patient.

Case 2.—Mrs. L. S., aged 49, was first seen at my office in February, 1934. At this time she complained of indigestion, numbness and tingling of her hands and feet, periodic diarrhea and brittle finger nails. She had enjoyed perfect health for years and only during the past six months had she noticed anything wrong with her physical well being. Six months previous she noticed that she was having occasional attacks of watery stools and this condition had remained until the present time. Further, there were vague gastric pains of no definite radiation or food relationship. At this time she noticed marked weakness and palpitation on exertion. In the past two months slight manual labor would invariably result in cracked finger nails.

Past history and family history are irrelevant. Physical examination revealed a well developed, well nourished white female with a definite anemic appearance. Examination of the hernial rings revealed a right inguinal hernia. The finger nails were pale in appearance, definitely of the watch crystal type. Leukonychia was present and the nails were soft and marked with fissures. Otherwise, physical examination gave negative findings.

Laboratory examination: Urine negative. Gastric analysis showed the absence of free hydrochloric acid. Blood: hemoglobin, 48 per cent; red blood cells 3,900,000, white blood cells 7,400. Color index .6.

X-ray examination of the gallbladder and gastrointestinal tract was normal.

Diagnosis: Achlorhydric hypochromic anemia; right inguinal hernia.

She was placed upon a normal diet and 90 minims of hydrochloric acid were administered daily. In addition she was given lexttron and iron ammonium citrate. Under this treatment the patient's condition improved rapidly with the result that four weeks later she refused to take treatment any longer. Three months later the original symptoms had returned, when she voluntarily placed herself upon her original medications, but stopped taking them when a friend advised her that the hydrochloric acid would eat out her stomach. The patient then placed herself on the diet of custard, jello and milk, and only upon rare occasions would she eat a normal meal. As time went on she began to lose weight and became extremely weak. On June 29, 1935, the patient again consulted me because of severe pain in the lower right quadrant, associated with constipation. Physical examination at this time revealed a striking condition. Her gums were swollen and edematous and the mouth was studded with ulcerative lesions. The palms of the hands were covered with an acute weeping bilateral symmetrical eczema. These lesions extended the length of the forearm to the elbow. The same lesions were present over the tibia and feet. In addition, the patient had an incarcerated right inguinal hernia. Blood examination at this time revealed her hemoglobin to be 42 per cent, red blood cells 3.2, and white blood cells 7,200. A diagnosis was made of pellagra, incarcerated inguinal hernia, simple hypochromic anemia. At two o'clock of that day, the patient was operated upon by Dr. Plondke for the relief of the incarcerated hernia. She was then placed upon dilute hydrochloric acid and a normal diet. Lexttron and extralin were administered orally and in addition she received two cubic centimeters of liver extract, intramuscularly. Hydrogen peroxide mouth washes were used to relieve the oral pain. The patient's response was dramatic. The skin lesions healed spontaneously and the skin was perfectly normal at the end of four weeks. Three months after discharge she was markedly improved. Her hemoglobin was 78 per cent, red blood count 4,500,000 and white blood count, 6,900.

Summary: A patient with achlorhydria placed herself on a limited diet. As a result of this diet she

developed a diarrhea and bilateral symmetrical eczema of the arms and legs. These lesions responded to an anti-pellagra regime.

Two cases of dietary pellagra are reported wherein by voluntary restriction of diet, pellagra developed and was completely relieved by anti-pellagra management.

ENORMOUS DILATATION OF LEFT AURICLE*

MAURICE HARDGROVE, M.D.

Milwaukee, Wisconsin

V. F., a white woman, thirty-eight years of age, entered the Minneapolis General Hospital because of acute cardiac failure of two weeks duration.

At the age of eighteen she had her first attack of rheumatic fever, which confined her to bed for six months. In the spring of the following year a second attack of acute swollen joints occurred, lasting seven months. She was able to carry on until she was twenty-four years of age, when dyspnea became severe and persisted for the following nine years.

At the age of thirty-three, after a severe upper respiratory infection, cardiac symptoms increased (weakness, dyspnea, precordial pain and edema of the legs), and she was admitted to the University of Wisconsin General Hospital, Madison, Wisconsin.

Physical examination at that time showed "pulsation of neck vessels, rapid respiratory rate, prominent heaving precordium, systolic retraction in sixth and seventh interspaces in the mid-axillary line, precordial pulsation in the third and fourth interspaces, palpable apical pre-systolic thrill, total cardiac arrhythmia, apical presystolic and systolic murmurs, accentuated pulmonic second sound, positive Broadbent's sign, limitation of expansion at the left base with râles throughout both bases, palpable liver, slight pretibial edema, hyperreflexia and blood pressure of 138/68.

"Laboratory findings included a urine containing an inconstant trace of albumin, a few leukocytes and an occasional hyalin cast. The blood count showed a hemoglobin of 66 per cent and red count numbering 4,820,000 on admission. The blood Wassermann was negative and the blood chemistry showed normal variations. Basal metabolism varied between plus 6.4 and plus 0.3, on four determinations. X-ray for heart size showed marked distortion and enlargement of the heart shadow, irregularity on the right side above as if from superimposed mediastinal or lung shadow; on the left the heart shadow extended to the lateral chest wall. Electrocardiographic studies showed auricular fibrillation and slight right ventricular preponderance. T₁ and T₂ were inverted.

"A diagnosis of rheumatic endocarditis, mitral stenosis and regurgitation, adhesive pericarditis, myocardial degeneration with mild decompensation, auricular fibrillation and secondary anemia was made."[†]

At the end of five months in the hospital, decompensation was still present, but she left on her own insistence. She had been on some form of digitalis medication for ten years at this time.

*From the Pathological Laboratories of the Minneapolis General Hospital and Department of Pathology, University of Minnesota Medical School, Dr. Lufkin, chief.

†Personal communication—Dr. W. S. Middleton. The University of Wisconsin General Hospital.

CASE REPORTS

While in the Minneapolis General Hospital, the patient was unable to lie down because of respiratory difficulty. The anterior thorax showed a heaving impulse in the region of the sixth rib in the left midaxillary line. A marked Broadbent's sign was present. There were both systolic and diastolic thrills over the entire

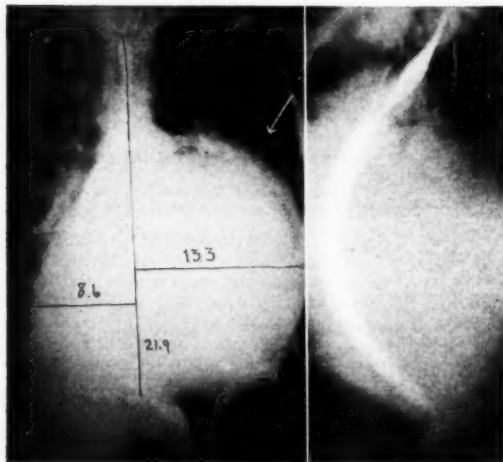


Fig. 1 (left). Barium in the displaced (R) esophagus does not show well.

Fig. 2 (right). Lateral view with opaque substance in the esophagus.

precordium. Percussion of the heart borders showed them to be moderately enlarged in all directions (2 cm.). At the base of the heart the tones were normal except that the pulmonic second was louder than the aortic second sound. No murmurs were heard in these areas. A very sharp first sound was heard at the apex as well as a systolic and a diastolic murmur. The pulse rate was ninety and the rhythm was that of an absolute irregularity. The systolic pressure averaged 110.

The urine contained traces of albumin, occasional hyaline and granular casts, erythrocytes and pus cells. The urine specific gravity varied from 1002 to 1017. The hemoglobin was 90 per cent. The red blood count was 4,170,000 and the white count 11,000 with 84 per cent polymorphonuclears. The Wassermann and Kahn tests were negative. Thirty-six per cent of phenolphthalein was excreted in two hours.

The electrocardiographic report showed diphasic T_1 and T_2 , as well as an isoelectric T_3 , suggesting myocardial damage. This combined with evidence of right ventricular preponderance pointed to mitral disease.

The x-ray showed as follows: TT — 25.8; ML — 13.3; MR — 8.6; Total 21.7; Arch — 2.8. There were very marked increases of the cardiac shadow both to the left and to the right. The left border reached the lateral chest wall and its upper portion assumed a convexity which under the fluoroscope appeared to pulsate. The soft tissue outline was thought to be the left auricle which was demonstrated to the right of the spine (Fig. 1). There was moderate increase of the broncho-vascular tree, suggesting congestion. The esophagus showed diffuse posterior displacement as well as displacement to the right, indicating marked enlargement of the left auricle (Fig. 2).

Cardiac distress became progressively more severe and the patient died on the thirty-fifth day of hospital stay.

Autopsy Findings

The body was that of a poorly nourished individual 166 cm. in length and weighing 100 pounds. There was edema (plus 3) of the lower extremities and dependent portions of the body. There was cyanosis (plus 3) of the fingernail beds and lips.

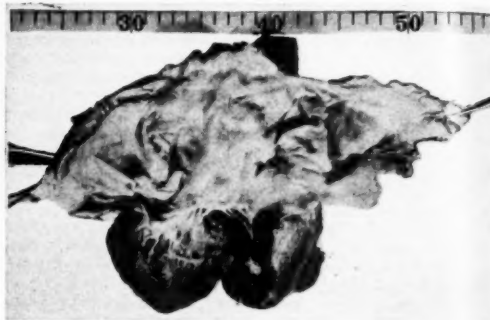


Fig. 3. Photograph showing the left auricle opened. Rule in centimeters.

The peritoneal cavity contained 1,000 c.c. of clear fluid. The dome of the diaphragm on the right was at the level of the sixth rib and on the left at the seventh. The liver edge was 4 cm. below the costal margin in the midclavicular line.

Both pleural cavities were obliterated by firm fibrous adhesions.

The transverse diameter of the thorax was 27 cm., while the transverse diameter of the heart was 21 cm. There were many old firm fibrous adhesions scattered throughout the pericardial sac, no more on the left than on the right. The heart displaced the lungs so that only the tips of the upper lobes were visible. The left auricle was found to be responsible for most of the enlargement as it occupied nearly one-half of the left chest, and also formed the right cardiac border. The mitral valve admitted the tip of the scissors (2 cm. in diameter). The leaflets were fibrous, thickened and immobile. The left auricle above the valve was tremendously dilated, being larger in size than the rest of the heart and having the capacity of 1,200 c.c. of fluid (Fig. 3). The left auricular wall was thin (3 mm.) and fibrous. It was firmly attached to the pericardium by adhesions.

The right ventricular wall was twice the thickness of the left. The aortic valve was 7 cm. in circumference, and other valves showed no change. The pulmonary arteries were not thickened. There was no ectasia of the root of the aorta and the coronaries were not sclerosed.

The total weight of the heart (with auricle) was only 450 gm.

The right lung weighed 560 gm. and the left 320. The lower lobes of both lungs were greatly compressed by the enlarged heart and crepitation was somewhat diminished. The color was dark purple on section and much fluid could be expressed. The upper lobes showed a diffuse brownish discoloration. Microscopic study of these areas showed chronic passive congestion to a marked degree.

The spleen weighed 90 gm. There was some compression of the upper pole. The liver also showed a deep depression on the superior surface of the left lobe as a result of the cardiac hypertrophy and dilatation. The section of the liver was that of cyanotic induration.

CASE REPORTS

The kidneys showed only chronic passive congestion (weights: R — 125; L — 120).
The other organs showed no abnormalities.

Comment

La Forque¹ in 1899 first described marked enlargement of the left auricle in a patient with hereditary aortic and adherent pericarditis. Owen and Fenton² in 1901 described marked enlargement of the same appendage.

Steel⁷ and Burkhardt³ recently reviewed the literature with reference to the subject of left auricular dilatation. In Steel's fifteen cases the enlargement was commonly associated with mitral valvular disease (stenosis more commonly than regurgitation) of rheumatic etiology. An adherent pericardium was present in nearly all of the cases.

X-ray examination helps in diagnosis. Schott⁴ followed progressive enlargement of the auricle with the orthodiagram. It is said that in 5 per cent of the mitrostenotic lesions the left auricle dilates to the right of the right auricle. Occasionally an individual with this type of heart disease may carry on for a long time. In one case described, the auricle contained 3 liters,⁴ another 1,700 cubic centimeters,³ and in our case 1,200 cubic centimeters.

Bibliography

1. Bland, E. F., and White, P. D.: Enormous increase of volume with mitral stenosis. *Jour. Am. Med. Assn.*, 96: 840-843, (March 14) 1931.
2. Burkhardt, Jr., E. A.: Marked dilatation of the left auricle. *Am. Jour. Path.*, 6:463-468, (July) 1930.
3. La Forque: Quoted by Rosset, A., and Bach, E.: Un cas d'anévrysme de l'oreillette gauche. *Arch. d. mal. du coeur.*, 17:145-151, 1924.
4. Minkowski, O.: Demonstration eines Herzens mit ungewöhnliche starker Dilatation der Vorhof. *München. med. Wchnschr.*, 51:183, 1904.
5. Owen, Sir Isambard, and Fenton, W. J.: A case of extreme dilatation of the left auricle. *Tr. Clin. Soc. London*, 34:183, 1901.
6. Schott, A.: Extreme dilatation of the left auricle. *Klin. Wchnschr.*, 3:1067, 1924.
7. Steel, David: Extreme dilatation of the left auricle. *Am. Jour. Roentgenol. and Radium Therap.*, 26:(July) 1931.

PEANUT KERNEL IN THE BRONCHUS OF AN ADULT*

PORTER P. VINSON, M.D.

Rochester, Minnesota

PEANUT kernels and shells are frequently encountered as foreign bodies in the air passages of children less than six years of age, but they are rarely encountered in older children and practically never in adults.

Many articles have been published in reference to the dangers of the peanut as a foreign body in the bronchi of children, but adults have not been warned sufficiently about the possible hazards associated with the aspiration of such foreign bodies. Vegetable foreign bodies of any type, but especially the peanut, may give rise to intense and serious reactions in the tracheo-bronchial tree of children, and in the case herewith reported, in which an adult was affected, this reaction was quite as severe.

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota.

The patient, a man forty-two years of age, came for examination December 19, 1935. On December 7, he had choked while eating salted peanuts and had had a coughing spell lasting about ten minutes. This cough had continued, without any other definite paroxysms, and the sputum had become purulent and blood-stained.

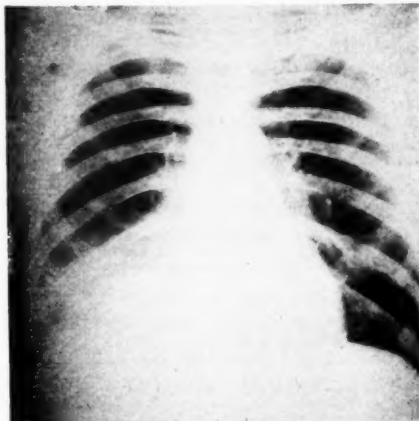


Fig. 1. Infiltration base of right lung.

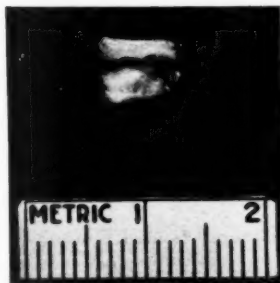


Fig. 2. Foreign body, portion of peanut kernel.

The day after the initial difficulty the patient had felt feverish and had noted some pain and wheezing on the right side of the thorax. After feeling ill for a week he had consulted his physician, who had found that he had a temperature of 104° F. Evidence of infiltration had been detected in the right lung and the patient was advised to come to the clinic for bronchoscopic examination.

At the time of examination, the patient was pale and coughed frequently. His temperature was 99.6° F. The percussion note was dull over the base of the right lung, posteriorly, and the breath sounds were distant over this area. Roentgenoscopic examination revealed diffuse infiltration over the lower lobe of the right lung that suggested the presence of bronchopneumonia (Fig. 1). Leukocytes numbered 16,000 per cubic millimeter of blood.

Bronchoscopic examination was made without delay and a portion of peanut kernel was removed from the bronchus to the lower lobe of the right lung (Fig. 2). The bronchial wall was slightly ulcerated at the point of lodgment of this foreign body.

Four days later the patient seemed quite well and was permitted to return home.

EDITORIAL

MINNESOTA MEDICINE

OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE

J. T. CHRISTISON, Saint Paul C. B. WRIGHT, Minneapolis
E. M. HAMMES, Saint Paul T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester

EDITORIAL STAFF

CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—\$3.00. Single Copies—\$0.40
Foreign Subscriptions—\$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, \$1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 411 National Bldg., Minneapolis. Telephone: Nestor 2641.

BUSINESS MANAGER
J. R. BRUCE, Saint Paul

Volume 19 APRIL, 1936 Number 4

Druggists and Doctors

COÖPERATION between the druggists and doctors is essential to the best interests of the public. Too often, there is a disregard, on the part of the one, of the functions and interests of the other. Interprofessional Relationship committees of state and county pharmaceutical and medical organizations have been in existence for several years, and, although not very active so far, they afford a medium for ironing out causes of friction and for coöperating for the best interests of the public.

The Interprofessional Relationship committees of the State Pharmaceutical and State Medical Associations had a meeting last month and discussed some rather interesting matters of common interest to the two professions. Both sides had some minor grievance to air, but the main object of the meeting was to get each other's viewpoint and find common ground for coöperation.

The modern drug store is almost everything but what its name implies. While every store must have a registered pharmacist, he, in most instances, must be a jack of all trades to make a living. Only in the larger centers can he limit himself to dispensing. The well-to-do druggist, let alone pharmacist, is a *rara avis*. There has been some agitation about distinguishing between the dispensing pharmacist and the ordinary druggist. Certainly a pharmacist's training is not all-sufficient to make him a successful present-day proprietor of a so-called drug store. On the other hand, we question whether in the present-day set-up many pharmacies limited to dispensing can prosper, although such a change would add dignity to pharmacy and should be welcomed.

The druggist has some criticism to place at the door of the medical profession. Some doctors, especially those in the country, do their own dispensing. While this makes it more difficult for the country pharmacist, the doctor justifies such action in the claimed saving to the patient and increase in his own income. Some instances of nice coöperation could be cited whereby the doctor is saved the trouble of maintaining a drug line and the druggist does not overcharge because he is filling a prescription. The initials "P.P." on a prescription do not stand for Latin words, but signify "poor patient" and most druggists will act on the suggestion. Coöperation in the prescribing of the multitudinous new remedies suggested by the detail men should help to limit on the shelves of the druggists the number of partly used bottles which constitute a loss to him.

Both doctors and druggists are responsible in part for the enormous amount of self medication in evidence today. The undignified practice of handing a prescription blank or often a mere slip of paper to a patient with the name of a preparation on it and no directions means that the druggist must sell a stock bottle to the patient with the original label on it and the name of the preparation will be handed about to friends for them to try. The need of a remedy merits the dignity of a prescription. Or, a phy-

sician may thoughtlessly hand out a sample with the original label not removed—a practice similarly favoring self medication. And some members of our profession have even been reported to have sold their free samples to patients. With the flood of samples, for the most part of little use, which reach the doctor's office, such an unprofessional procedure on any appreciable scale would, by easily underselling the corner drug store, materially interfere with its sales. The druggist, on the other hand, is daily put in the embarrassing position of being quizzed about remedies for this and that. He is not entitled to prescribe, and, without being arbitrary about it, the medical profession is entitled to expect the druggist to decline to prescribe, although his reference of a customer to a doctor may appear like a conspiracy on the part of the druggist and the doctor. Much harm may be done an individual who is assisted by a druggist in self medication.

Perhaps one of the most outstanding instances of harmful self medication is the unrestricted dispensing of barbiturates and similar preparations. There is a growing sentiment among pharmacists and doctors that the sale of these drugs should be limited by law to sale on prescription. Although this would undoubtedly mean fewer sales for druggists, thoughtful members of the profession are convinced of the desirability of taking this step already taken in the British Isles. Here is an instance where, if the executive bodies of both professions should determine its advisability, the two professions could coöperate in obtaining appropriate legislation.

In addition to the possible harm from self medication, the uselessness and enormous waste of money involved is reason for active coöperation between druggists and doctors. A beginning has been made in the circularization of the medical profession by the combined Interprofessional Relationship committees with printed cards showing the much lower costs of the official compounds compared to imitation proprietaries. The committees are further circularizing the profession of the state with useful prescriptions. Laziness and poor undergraduate training in prescription writing and pharmacology in general result in the doctor's unwittingly aiding the proprietary racket.

Our Caribbean Neighbors

ON a Caribbean cruise one absorbs besides sunshine and fresh air certain impressions of the various countries and peoples not so far from our very doors.

Our acquisition of Porto Rico in 1898 presented a problem which we have only begun to solve, with the establishment of public schools, the construction of good roads, and the passing of certain hygienic regulations such as enforced protection of the feet to prevent hook worm infection. The poverty of the natives is only too striking. The needs in this tropical island are few, work is for the most part seasonal and poorly paid, and earnings easily frittered away in shooting craps and in cock fighting. The natives live on a dish of rice, beans and perhaps a little chicken, even the native fruits being sold in the markets, and meat prices are prohibitive. Undernourishment prevails. Baseball and the ice cream soda have interestingly accompanied beginning Americanization.

Venezuela presents the opposite extreme. This country's oil resources, which have been developed only in the past two decades by foreign oil companies, have furnished so much revenue that Venezuela holds the unique position of a country without a national debt (U. S. please notice). And this in spite of the unbelievable graft perpetrated by Gomez, who held his dictatorship from 1908 until his death last December at the age of seventy-eight. He collected a personal contribution from the foreign oil companies for every barrel of oil exported. It is common knowledge that Gomez was the proud father of some eighty offspring, although never having found it expedient to bind himself with matrimonial bonds. It is said that when Gomez died of a Sunday in December last the news of his demise was withheld from his people until the following Thursday to enable his various heirs to remove his fortune, estimated at some \$700,000,000 in gold, and themselves to the nearby island of Curacao. Naturally the name of Gomez is anathema to Venezuelans in spite of the marvelous development of the country during his dictatorship. This is in extreme contrast to that of Bolivar, the George Washington of South America, whose memory is fittingly recorded in the capitol at Caracas. This remarkable general was not content to free one country from Spanish rule, but before his death at the

age of forty-seven he liberated four other South American countries also: Colombia, Ecuador, Peru and Bolivia. Caracas, the capitol of Venezuela, was located for protection against buccaneers five miles back and 3,000 feet above its seaport, La Guaira, and is reached over a marvelous mountain road winding back and forth over a range of the Andes.

Abounding with beautiful and pretentious villas, Caracas possesses a country club that would put any Twin City club house in the shade, although not so much can be said for the burnt up fairways of its golf course. The cattle ranches of the inland plains of Venezuela provide beef at ten cents a pound, as the nutrition of the natives testifies.

Not far west of La Guaira lies the small Dutch island of Curacao with its capitol Willemstad, which might be a replica of a town in Holland. Its tinted houses with tiled roofs and its cleanliness testify to its Dutch character. The market consists of rows of sailing craft lined up along its natural harbor and loaded with food stuff from Venezuela, most of its food having to be imported. Its major industry is the refinement of crude oil shipped from Venezuela in small barges.

Colombia seems less prosperous. In spite of pretentious dwellings in Cartagena, the streets are poorly paved, if at all, and beggars abound. The dungeons under the old city wall where prisoners were left to die at the time of the Spanish Inquisition, and El Popo monastery on an eminence overlooking the city, where the nuns threw themselves over a sheer cliff rather than fall into the hands of that most ruthless of buccaneers, the Englishman Henry Morgan, serve to recall tragic days in the history of this part of the world.

The Panama Canal, sometimes called the eighth wonder of the world, is a tribute to man's perseverance and sanitation. Instead of a region infested with yellow fever and malaria, the control of the breeding places of the *Stegomyia* and *Anopheles* mosquitoes has made the Canal Zone one of the most healthful regions in the world. One is impressed with the size of the cities at both ends of the canal and the polyglot population. The shopkeepers of various nationalities offer goods from all over the world at enticing prices to the thousands who visit the cities each year.

The countries bordering the Caribbean Sea have lived through a stormy past, having been repeatedly conquered by various European nations and having been for a period at the mercy of the buccaneers. Recent years have been more kind and certain of the nations have made great strides, while others have far to go to overcome a natural slovenliness in living, which seems to be indigent to tropical climates.

C. B. D.

Dr. E. T. Bell's Seminar

PATHOLOGIC conferences are among the most important medical meetings held. The conference held at the University Medical School each week by the Department of Pathology under the direction of Dr. E. T. Bell is particularly instructive. Dr. Bell has consented to report a few of the most instructive cases presented at the pathologic seminar each month in MINNESOTA MEDICINE, beginning with this issue. Each case will be presented as a diagnostic problem, "die Erklarung" to follow. We feel sure that our readers will welcome this additional feature in the journal.

Early Diagnosis Campaign

Describing tuberculosis as "the robber of the prime of life," the nation-wide educational campaign of the National Tuberculosis Association and its branches will be conducted throughout the month of April.

Focusing the attention of the public on the importance of locating tuberculosis in its early stage, before there are any symptoms, the campaign will emphasize the fact that tuberculosis takes the majority of its victims from lives of active usefulness. Literature now being distributed by the Hennepin County Tuberculosis Association states that:

Tuberculosis takes 75,000 lives in the United States every year.

The majority of its victims are between 15 and 45 years of age. In this age group are students, parents of young children, wage earners, business leaders and professional people.

There are half a million people actively ill with tuberculosis right now in the United States.

To reduce the death toll of tuberculosis, the tuberculosis associations will unite in urging regular medical examinations, including the tuberculin skin test and, if necessary, the x-ray. "If all cases of tuberculosis were found as early as they can be detected through the use of the tuberculin skin test and the x-ray, and properly treated, tuberculosis would no longer be so great a danger to us all," a campaign message reads.

MINNESOTA MEDICINE

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
L. H. Rutledge, M. D.

W. F. Braesch, M. D., Chairman

J. C. Michael, M. D.
A. N. Collins, M. D.

President's Message

Each month, each week, brings a new challenge to the already overworked physician.

The recent County Officers' Meeting brought us face to face with two problems, especially, that require more of us than pious words and promises.

One of these problems is the necessity for establishing medical care for the indigent on the basis of free choice of physician in every county in Minnesota.

The other involves the necessity for fighting any general centralization of public health and medical services under a state board of social agencies. There are others.

Thus it is that medical men have work to do. Besides taking care of their practices, keeping up with scientific progress, they must be sociologists, economic experts, political strategists.

There is no use to argue that they are busy; they have no time. There is no choice for the medical man; he must make time.

Otherwise he will be superseded at the council table by the willing welfare workers and the willing politicians who have plenty of time.

Perhaps there are people who can afford to drift with the modern current, not caring to what strange shore it washes them. But not the doctors. Public welfare, scientific progress, medical freedom are at stake and the doctor must fight for them.

W. W. WILL,
President, Minnesota
State Medical Association.

County Officers' Meeting

More than sixty secretaries, officers, council members sat down to breakfast together for the round table conference that opened the 1936 County Officers' Meeting at the Hotel Lowry in Saint Paul, February 29.

They were joined by many others as the day-long conference went on and the whole ended with a general discussion of what is obviously the most critical immediate problem of organized medicine in Minnesota: the re-adjustment and

improvement of Minnesota county plans for medical care of the sick poor.

New Plan

A novelty in seating arrangements marked the morning conference. Each councilor district had a table to itself so that neighbors from the district might talk over matters of local interest with each other and with their councilors. The new plan worked admirably.

A crowded and important general program halted these district discussions.

Representatives from nearly all of the government bureaus and agencies that, in these changing times, play an ever more important part in the medical care of the sick and in public health, were there.

They talked and they answered questions. The following résumé recounts very briefly what they said and also what medical leaders told the attending members:

Mr. Henry W. Goetzinger Industrial Commission of Minnesota

In general, the responsibility for provision of medical care for the injured worker under Workmen's Compensation Law in Minnesota lies with the employer. The employers, then, with the advice of the Industrial Commission, must see that the patient is cared for by qualified physicians; that he is protected against quacks and cultists even of his own choosing.

The Industrial Commission readily coöperates in securing change of physician if it seems justified and in approving the bills of the physicians of the patient's choosing providing, for some reason, the employer has refused or has been unable to provide a qualified physician.

The classification of physicians as "M.D.," "Osteopath," et cetera, has been added to new report blanks so that the commission can identify competent medical opinion.

Penalties

Business establishments employing more than one person can be fined in case of injury to an employe, if these establishments are not financially responsible and have not taken out insurance. The penalty is five times the cost of insurance, but no imprisonment is provided.

Unfortunately, the attorney general's office has been unwilling to press prosecution in this matter even in the case of flagrant violations of the statute.

An amendment to the compensation law was passed at the last session of the Legislature which gives the physician a simple method for securing judgments on awards for medical services. He has only to show the court that his bill has been allowed by the Industrial Commission.

Mr. H. S. Gossage Chief of the Narcotic Division

Addicts use numerous ruses to obtain narcotics. The most frequent are spasms of coughing, renal colic, cramps, internal female troubles. Some of them even resort to use of pins or toothpicks so as to cough or pass blood.

No physician should rely upon symptoms alone or upon the word of a patient in prescribing a narcotic. A thorough examination is necessary in every case, especially of new or itinerant patients.

The physician cannot relieve himself of responsibility by placing any blame upon the patient.

Doctor's Job

The Narcotic Division, on its side, has no power to prescribe narcotics itself or to authorize such prescriptions on the part of the physician. That is the job of the doctor alone.

As a registrant under the Harrison Narcotic Law, the doctor is required to keep his tax stamp in display in his office. To fail in that is a violation of the law.

Except as specifically provided in emergencies, it is also a violation of the law to telephone prescriptions for narcotics. In case of emergency the druggist may deliver narcotics pursuant to a telephone order, if the druggist or his agent is provided with a properly prepared prescription at the time the delivery is made.

Mr. Fred G. Garling State Liquor Commission

In certain dry territories of the state there are still abuses of the liquor prescription privilege. In one dry town of 4,000 persons the drug store was found to be making sales of approximately 3,000 pints each month. There are at least fifty-nine drug stores like that one in the state. We hesitate to take any move against them as we seem unable to mete out any punishment under our present state law.

Only a minority of physicians offend in this regard but the profession in general should make it clearly understood that it is emphatically opposed to this abuse of medical privilege.

Mr. Kenneth E. Setre U. S. Public Health Service National Health Inventory

The so-called National Health Inventory is nearing completion in Minneapolis, Saint Paul, Winona, Brainerd and Chisholm. Physicians in these localities will shortly receive blanks asking for confirmation of diagnoses reported by patients at the door. These blanks will be sent only with the consent of the patient. They will be sent direct to the physician from the office of the Surgeon General in Washington and they are to be returned to Washington. The physician who thus confirms or corrects the diagnosis secured at the door by the enumerator is not violating the law, so the Attorney General says. He will receive twenty-five cents for each blank that he fills out and sends on to Washington and, for convenience sake, the blanks will be sent to him in groups instead of singly.

Other Studies

The Chronic Disease Survey is being followed by a survey of all hospital and health facilities in the cities selected. Also a survey of occupational disease and mortality in Minneapolis, Saint Paul and International Falls, and an examination by audiometer of all who are reported deaf in the chronic disease survey to determine the amount of deafness.

In connection with the last named investigation, an additional group will be selected for hearing measurements from among those who have not been reported as deaf in any degree. The object is not only to secure valuable data about degrees of deafness related to age, dis-

ease, et cetera, but to enable statisticians who use all these figures to estimate the accuracy and value of the items reported on the schedules for the country as a whole.

(As noted in these columns, the uses to which these statistics are to be put are presumably scientific and there is no doubt that many of them will prove valuable. They will be available, also, to that eager body of reformers who yearn to re-organize medicine in the United States. That these reformers await the results with impatience and that they will be able to twist the figures to suit almost any preconceived notion also goes without saying.)

M. M. Hirsch **County Commissioner, Itasca County**

The doctor's point of view on the problem of medical care for the indigent was presented for the first time to the Minnesota Association of County Commissioners at its meeting in Minneapolis, February 28.

Dr. O. E. Locken of Crookston put the case, and the commissioners listened. Their Resolutions Committee had accepted, without objection, a resolution approving the fee basis plan which guarantees to the indigent patient a free choice of physician. It was voted down (Dr. Hirsch alone dissenting) on the floor.

"Unnecessary Calls"

No reasons were given for the defeat, but among personal observations overheard among the commissioners, this one appeared frequently: "When doctors are paid on the fee basis, they frequently make unnecessary calls."

(It was agreed by others who attended the meeting, including E. A. Meyerding, secretary, and L. L. Sogge, chairman of the Committee on Public Policy and Legislation, that Dr. Locken's talk was well received, though unfortunately it had to be scheduled after—not before—presentation of resolutions. The Locken talk gave the commissioners something to think about and assuredly they will be more approachable next year.)

E. A. Meyerding **Secretary**

Promotion of the Red Cross First Aid program serves to call attention to what might be a dangerous procedure on the part of Red Cross officials and of some county medical societies, too.

When the American Medical Association approved the Red Cross program it was with the

stipulation that state medical societies, in each case, should be consulted and their approval secured.

The Red Cross, without any malicious intent whatever, went direct to county medical societies for approval and assistance. Organized on regional rather than on state lines, the Red Cross is not in the habit of dealing with state organizations. Many county societies listened, also, and gave a more or less doubtful approval without consulting the state society.

No Harm Done

In this case, no harm is done. The program as a whole is without offence, though there may be difficulties here and there when it comes to working out such details as the order of doctors' names to be posted at the filling station first aid headquarters.

County societies are especially urged, however, to refer all such matters to the state office as a matter of routine for information and advice. Other general programs will be proposed by outside organizations and they may not be so innocuous as the First Aid program of the Red Cross.

(The Council, upon being tardily asked for its approval of the program, passed a resolution on the subject later in the day which is printed elsewhere in this issue.)

George Earl **Councilor, Fifth District**

There is a shortage of nurses in city and rural hospitals today. This grave state of affairs is undoubtedly related to the demands of nursing associations for higher education standards and requirements for nurses.

When more and more nurses are educated to become teachers and executives, fewer are available for essential bedside care.

Also, advancing standards of education mean advancing costs, and a serious shortage of good nurses available at a price the public can pay.

What are we doctors going to do about it?

The time has come when we must consider the matter seriously. We have no quarrel with education as such. A nursing corps that is graduated from highly professional training schools followed by a hospital internship is a good goal to aim at a hundred years from now.

But what are we going to do for bedside nurses to staff our hospitals now?

Opposition Group

It would seem that nursing progress has already over-reached the public purse. An opposition group is developing that declares standards have advanced too far; that ward nurses and attendants must be trained at a much smaller expense in time and money to take care of patients, particularly for the smaller hospitals.

Such a solution is not pleasing to the professional associations of nurses. But these associations must take account of this tendency and make adjustments accordingly.

(Discussion brought out complaints of nursing shortage in many parts of the state. A commissioner of the Department of Education will study the matter. Representatives of the Minnesota State Medical Association have been asked to confer with nursing associations on the subject.)

H. Z. Giffin, Rochester Councilor, First District

The following resolution was passed at a meeting of mayors and relief workers of Minnesota called by L. P. Zimmerman, relief administrator.

1. RESOLVED: That the Executive Council be urged to announce its policy and program of allocation of state funds to aid local governments in formulating their programs in financing direct relief. We strongly recommend that the funds be allocated to meet commitments incurred in 1936.

2. RESOLVED: That this committee feels it essential that the Federal Government give further direct relief grants to states; that direct relief again be established regardless of plans for any work program or security measures; it is the opinion of this meeting that if the Federal Government does not so act, the direct relief needs of Minnesota cannot be met.

3. RESOLVED: *That this committee believes the various types of public welfare now administered by several state agencies be coördinated with a modern state welfare department; that local units of government administering welfare be similarly coördinated into local welfare departments to fix responsibility and to secure efficiency, economy and improved service and that the state and local welfare services be articulated; that it hopes the Interim Committee of the Legislature will study the situation thoroughly; that this committee and these cities and counties pledge any advisory assistance to the Interim Committee which we are able to give.*

4. RESOLVED: That the Federal Government continue a system of federal aid and rehabilitation to the Indians of Minnesota and that the Government appropriate the necessary funds for doing so; and that this

action is urged in order to conserve state and local funds available in the state.

5. RESOLVED: That the Federal Government be asked to continue its aid to interstate transients because local governments are unable to carry the cost burden under existing financial and legal limitations.

The danger in this proposal lies in the fact that a powerful executive board can be set up under it—and that this board, which would so largely control public health work and medical care in the state, would be made up chiefly of social workers.

This is a matter that requires careful watching. We must act when the time comes to protect the practice of medicine from any such lay bureaucratic control in Minnesota.

The problem of medical care for the indigent in the state also presents itself with a renewed urgency just now.

With the return to the counties of complete responsibility for relief, the need for new and better arrangements for medical care of the sick poor becomes acute. Our Committees of Three should be in constant touch with their county commissioners and the welfare board now being formed under the county commissioner control for management of relief.

Time lost now in getting a good start under the new organization cannot be made up.

Weakening the Seal

I want to mention another matter that touches medical men in Minnesota. That is the proposed Easter Seal. Our council has already gone on record as opposed to the sale of another seal in Minnesota, not because the council is opposed to the work for crippled children that is carried on by the Minnesota Association for Crippled Children, sponsor of the seal, but that duplication will inevitably weaken the seal as a means of raising funds. It is a method which belongs by right of years of use and development to the National Tuberculosis Association and its state units for the support of the tuberculosis movement.

Our intimate association with the Minnesota Public Health Association, affiliated unit of the National Tuberculosis Association in Minnesota, prompts us to regret particularly any encroachment on the part of any other organization, however reputable in itself, upon the Christmas Seal.

L. Sogge, Chairman
Committee on Public Policy and Legislation

The proposal for a state welfare board to co-ordinate all health and welfare activities will be studied by the Interim Committee from the Senate and House. It is quite likely that some such proposal will be brought before the next Legislature. There is a precedent for it in a few other states and a nation-wide demand on the part of some lay social workers for such boards.

It will be necessary for us to keep in constant touch with the members of the committee to be ready, if necessary, to act.

Monte Piper, Rochester
Travelogue

As secretary of the Olmsted-Houston-Fillmore County Medical Society, I visited fifty-two doctors in the course of a 600 mile tour within the three counties. Twenty-one of these were members; forty-two were in active practice. Twenty-nine were more than fifty years old and ten had been graduated from medical school since 1930. Twenty-five had been in practice more than thirty years.

These fifty-two men live and practice medicine in forty-two Minnesota towns with a population of 15,000 persons. That makes the average number of patients to a physician 1,544. (The average number for the state is about 800.)

The trip took us through a very beautiful section of Minnesota and yielded a great deal in the way of historical and human interest. Also a number of the non-members were persuaded to join the association.

Mr. Victor A. Christgau
WPA State Administrator

WPA has set up no clinics and no dispensaries. It is our policy to maintain the personal relationship between the WPA worker and his physician. In all cases of injuries in the course of WPA work, the patient is sent to his own doctor if he has one. To date, 650 doctors have treated WPA cases though there have been only nineteen injuries for every million man-hours of work.

Direct relief is cheaper than WPA, but it is not the "American way." By giving men work with a "security" wage (more than the dole, but less than they might obtain in private employ-

ment), we rehabilitate the spirit. The principle back of WPA should be adopted as a permanent policy for industry as well as for government.

If we had been ready with such a plan earlier, we could have maintained a stable economic situation. Now, at any rate, we are in a position to profit by unhappy experience. We can prevent future depressions by perpetuating this plan for work and security.

B. J. Branton
Malpractice

Some insurance companies who write malpractice insurance are leaving the state. Others are raising their premiums.

The function of the Medico-Legal Advisory Committee is to gather statistics, work out methods, instruct physicians. The object is to assist doctors to keep out of litigation. The trouble of one member belongs to all. We must lessen the number of cases and so lower our premiums. We should remember that 51 per cent of all malpractice cases start as a result of remarks made in some other doctor's office.

Mr. B. E. Youngdahl, SERA
Director Social Service

At present there are no fewer than nine distinct and separately administered state relief programs, several of them administered from Washington. Among them are the state relief set up by legislative act under the Executive Council; War Veterans' relief; WPA; Resettlement Administration; the State Soldiers' Home; Children's Bureau under the State Board of Control; old age assistance.

All of these have either little or no coördination with each other. *I am convinced that the lack of coördination among the various agencies will force an issue during the present year and that some legislation will be enacted to provide coördination at the next legislature.*

County is Responsible

Direct relief now becomes the responsibility of the county. It is possible that there may be as many as eighty-seven different types of medical aid. Any state relief agency that the Executive Council may set up to supervise expenditures will be supervisory only. *It will not have the power to say to the county commissioners, "you must do this or you must do that." If*

money is being wasted in the counties or spent improperly, then and only then can the Executive Council step in and refuse to make allocations.

Old Bills Will Be Paid

Outstanding relief bills of physicians will be paid on the old basis. In case of disputes the physicians involved should bring the matter to the relief office as soon as possible for adjustment and payment.

The new relief law makes no mention whatever of the Township System of handling relief. In the opinion of some, the new state law automatically eliminates the old township system in favor of relief on the county basis.

It should always be remembered that the 67,000 WPA workers are not eligible for direct relief. At the same time their security wage, averaging about \$44 a month, is not large enough to pay medical bills. The only recourse of medical men is to approach their own county commissioners with this problem and strike a bargain.

O. E. Locken
Crookston

We have heretofore neglected an important body in this state: the association of county commissioners. I went before that body yesterday to talk to them about a problem of which they obviously knew very little and cared less.

It is time for us doctors to educate these men about the true significance and importance of preserving to the patient the right of free choice of physician. We must make these commissioners see that any other basis for medical care will destroy a vital service.

It is also time for us to go to the physicians who are accepting contracts for care of the indigent from the county commissioners. We must persuade them to refuse such contracts in favor of better and safer plans.

W. W. Bauer, Director
Bureau of Public Health and Instruction
American Medical Association

The general objection to Federal subsidies lies in the following consideration: when Federal subsidies relieve local sources of public aid, the local sources dry up; under Federal subsidies, the control is centralized and the program loses local elasticity.

Federal agencies concerned with supervision of Social Security funds are eager to cooperate with the medical profession through its state agencies.

Each state association must handle its own problem, however. Upon a close cooperation with the physicians of each state will depend the worth of the new program made possible by these federal funds.

It is the doctor's responsibility and it is to his interest to see that money is not wasted.

There are certain functions of a public health program that have been recognized for a long time. They are still inadequately done or not done at all. Among these are: (1) control of communicable disease; (2) keeping vital statistics; (3) complete records; (4) control of tuberculosis and venereal diseases; (5) sanitation, protection of water, food, milk; (6) public health education.

A close relationship between organized medicine and the organized public health agencies will operate to keep new programs on a sound basis.

A. J. Chesley
State Health Officer

We propose to set up three full time health officers with several districts instead of individual counties under their jurisdiction. This is a requirement of the United States Public Health Service; public health funds available under Title Six cannot be used except under the jurisdiction of such officers.

About 47,000 dollars will be available out of the population grant for this purpose. This money is secured by matching it with existing state appropriations.

We shall not be able to avail ourselves of the additional funds set aside to be matched by new appropriations since there are no new appropriations (since January, 1935) for health service in Minnesota.

Plan Approved

Our plan for the maternal and child health program under Title Five of the Act has been approved in Washington. The amount of money available is still uncertain, though we understand that it will amount to about five-twelfths of the total appropriation for the year ending June, 1936.

The appropriation for crippled children under

the Children's Bureau of the Labor Department has not yet been acted upon by Congress. We assume that the money will be appropriated.

We shall be seriously embarrassed if these appropriations do not materialize. We need thoroughly trained nurses to carry out these programs as well as health officers and sanitary engineers. We shall need, also, a child hygienist, a pediatrician, a dental hygienist and a public health educator.

Fortunately, there will be an approved training center at the University of Minnesota. We can participate in the training of the personnel and we confidently expect that this will be a saving grace for the entire program.

I want to say a word to you about the proposed state welfare board. *Four times in the history of the state such a board has been proposed and defeated.*

If you want lay social workers running medical affairs, a central Welfare Board is the way to do it. *I am opposed to lay domination of essential medical and scientific procedures.*

The Council Meets

Free choice of physician is fundamental to good medical care for the indigent. The Council passed a resolution to this effect, directed President W. W. Will to write a letter to all county medical societies about it and county Committees of Three to make an earnest effort to persuade county physicians wherever they survive to withdraw.

First Aid

Red Cross First Aid Stations received approval of the Council with the following provisos: that all medical aspects of the program in each community be under the control of the County Medical Society; that the chairman of each first aid committee be a physician.

Alcohol Permit

At the suggestion of the State Liquor Commission, the Council recommended a new regulation for a \$1.00 alcohol permit for physicians. This permit would entitle the physician to purchase alcohol at wholesale prices.

Confidential

It is the opinion of Senior Surgeon R. R. Spencer of the United States Public Health

Service that the physician is in no way liable to suit for supplying information for statistical purposes in connection with the Chronic Disease Survey.

The Council listened to the Surgeon General's opinion but advised any physician who was in doubt, to ask for a written consent from his patient anyway before yielding confidential information.

Litigation Without Protection

Statistics from the records of three of the largest companies writing physicians' liability insurance in our state have been freely opened to your Medico-legal Advisory Committee. They show the marked increase in number of cases from year to year in Minnesota. The incurred loss ratios in one instance was 121.5 per cent in physicians' liability and 140.9 per cent in hospital liability insurance in a five-year period—the others showing losses far above earned premiums. These figures convince the committee that the increase in individual premiums is justifiable. Under present conditions, ceasing to write policies in certain parts of the state is good business on the part of the companies. We may well ask, what about the man who, a member of our association, is in active practice in these sections? Is he to be beset by the *fear of litigation without protection?*

That fear only one knows who has experienced it. As a result of it he cannot do the best work for his clientele; he is timorous about taking advantage of new advances in treatment, fearful of censure following each operative procedure and apprehensive that he may be the victim of undeserved criticism before a crowded courtroom for something over which he had no control.

With an unfortunate situation such as this, it is easy to see that not only the victim of the suit but the people in the locality as a whole suffer.

Confidence of the community in its physicians must be built up, not broken down. It will be broken down if physicians publicly criticize each other. County medical societies should take notice of members who give unfair testimony against other members. Mutual helpful understanding, and not discord, must be the aim of all members of our State Association if we are to

lessen the number of cases and reduce the yearly premiums.

"All for one and one for all," might well be our motto. Are we encouraging or discouraging malpractice litigation? Increasing or helping to decrease the cost of our neighbors' insurance? Can we say with Carlyle, "The courage we desire is not to die decently but to live manfully"?

MEDICO-LEGAL ADVISORY COMMITTEE.

Politician's Paradise

In a certain railroad town of 300,000 people there is a 1,600 bed hospital. This hospital is twenty-five stories high and very handsome (they used it for the highly polished and luxurious background of a popular medical movie not so long ago). Lights are on night and day on the top floor. Expense is no object. Medical care is free for all: no questions asked.

A former interne at this institution tells an interesting story which shows, among other things, what a sound political instrument can be built out of a well provided hospital; also what happens to medical standards and professional freedom when a politician is in charge.

In this case, the mayor of the town is the "angel." It is the Mayor's proud boast that "he takes care of his people." No one was ever turned away from His Honor's hospital.

Good Show

To prove it, there is always a shiny ambulance, a trig interne, a starchy nurse in attendance at his meetings to take care of His Honor's people. Incidentally, they make a better show than the police band or even the Boy Scout patrol.

The hospital is run by one of the mayor's friends as superintendent. There is a closed staff. There are six to eight resident physicians and ninety to 100 internes. The internes do most of the work. They receive no pay and they are busy day and night. They must go anywhere in the city to anyone who calls them in one of the ten ambulances maintained for the hospital by the mayor. But they have fine living quarters (there is a library for their use, though it has very few books) and they are well treated. Nurses are well housed and well treated, too, and

there is no difficulty in supplying either internes or nurses.

To Please the People

The object of the institution is first and foremost to please the people.

Naturally, the finer points of medical care are neglected. Teaching and research suffer. Naturally, also, internes, nurses, staff members, must do what they are told. On one occasion our friend, the interne, was washing up to operate when word came that he must go immediately and register to vote. He went and he was instructed how to vote.

Judged by scientific standards this fabulous institution falls short, of course. There were only 5 per cent of autopsies last year. Judged by numbers of patients, numbers of ambulances, numbers of almost anything else, it is certainly one of the outstanding institutions of the country.

Plenty of Money

Where does the money come from? From the railroads that are obliged to go through the town; from the government through the mayor's own relief arrangements for care of the sick poor. There is plenty of money. Staff members received stipends that vary from \$8,000 to \$12,000 a year—minus several thousands that must, of course, go back in tribute to His Honor the Mayor.

Here is a model for politicians to copy. Perhaps it is simply a forerunner of what State Medicine will mean in the United States. Certainly it is close enough in all respects to the Community Health Center advocated in the Majority Report of the Committee on Costs of Medical Care to warrant close study. What will happen when the other politicians wake up to the vote-getting possibilities of medical care?

Summer Round-Up

The Summer Round-up of the Children, annually promoted by the Parent-Teacher Associations, will begin shortly in Minnesota.

Its objective—to send the children to the opening grades of school or kindergarten in good physical and mental condition—has the sympathy and support of the medical profession.

Some of its methods have been open to ob-

jection in the past. But experience and the close coöperation between the national advisory committees of the Parent-Teacher Associations and the American Medical Association have ironed out most of the misunderstandings. Sponsors for the effort and the doctors who help them to carry it on are now well agreed on principles. They should work together harmoniously and effectively if both will follow the instructions for the 1936 campaign that are printed in the February *Bulletin of the American Medical Association*.

Every physician is urged to read this statement of purposes and the appended suggestions for local plans of action. If these plans can be put into general practice, each year will see a more and more solid foundation laid for the health of school children and for improved relations between children and their parents and the family doctor.

Minnesota State Board of Medical Examiners

St. Paul Woman Sentenced to Two Year Term at Shakopee

State of Minnesota vs. Mrs. Ida Bare.

Mrs. Ida Bare, forty-two years of age, entered a plea of guilty on March 4, 1936, before the Honorable R. A. Walsh, Judge of the District Court, of Ramsey County, Minnesota, to an information charging her with the crime of abortion. Judge Walsh sentenced Mrs.

Bare to a term of not to exceed two years at hard labor at the Woman's Reformatory at Shakopee.

Mrs. Bare, who lived at 457 Rice St., Saint Paul, and who had no medical training except a little knowledge gained as a practical nurse, attempted on February 18,



1936, to perform an abortion on a thirty-two year old Saint Paul woman. The uterus was punctured by the use of a catheter, resulting in the almost instantaneous death of the patient. The cause of death was given as air embolism following an induced abortion. There was no evidence to connect this defendant with any other offense and she was permitted to plead guilty to abortion rather than manslaughter. Judge Walsh also saw fit to limit the sentence to two years rather than the statutory maximum of four years.

Splendid coöperation was received by the Minnesota State Board of Medical Examiners from Dr. C. A. Ingerson, Coroner of Ramsey County, and from Mr. M. F. Kinkead, County Attorney, James F. Lynch, Assistant County Attorney, and Detective Alvin Johnson, assigned to the County Attorney's office.

Polk County "Naturopathic Physician" Convicted By Jury

State of Minnesota vs. "Dr." Knute H. Luross.

Knute H. Luross, forty-three years of age, was convicted on March 12, 1936, by a jury in the Court of the Honorable James E. Montague, Judge of the District Court for Polk County, Minnesota. Luross for several years has maintained an office at Fosston, Minnesota, where he has practiced as a naturopathic physician. He has carried the following advertisement in the Fosston newspaper:

DR. K. H. LUROSS

NATUROPATHIC PHYSICIAN

All chronic and acute diseases successfully treated by Latest Natural Methods.
Hillestad Hardware Building

Phone 182

Fosston

The defendant was first arrested June 3, 1931, following an investigation by the State Board of Medical Examiners, on a charge of practicing healing without a basic science certificate. In order to accommodate the naturopaths in their desire to have the Basic Science Law tested in the Supreme Court, a continuance was agreed to and a mandamus suit was commenced by one W. W. Shenk against the Basic Science Board. The purpose of this suit was to obtain a basic science certificate for a naturopath (Shenk) without an examination. The naturopaths lost in the District Court of Hennepin County, and they also lost in the Supreme Court of Minnesota. It was understood that in the event the Shenk case was lost by the naturopaths, Luross would enter a plea of guilty. He refused to do this and a new case was instituted because of the lapse of time occasioned by the appeal in the Shenk case.

Luross continued to practice healing at Fosston, Minnesota, and on January 22, 1935, following another investigation, a complaint was filed against him under the Basic Science Law. Luross claims to be a graduate chiropractor from the Palmer School of Davenport, Iowa. He was unable to secure a chiropractic license in Minnesota and for some reason or other has not taken the Basic Science examination, although the only requirements to take the Basic Science examination are that the applicant be twenty-one years of age, that he have a high school education and be of good moral character. From 1927 to 1929 Luross held a massage license but did not renew it in 1930 when the masseurs were under the jurisdiction of the State Board of Medical Examiners. He has remarked on several occasions that no jury in Polk County would convict him; perhaps his opinion in this respect has been corrected. At the trial Luross did not take the witness stand and the evidence was uncontradicted that the defendant referred to himself as a doctor, naturopathic physician, and that he maintained an office at Fosston for the practice of healing. Judge Montague granted a stay of thirty days to give the defendant and his counsel an opportunity to determine whether or not they wished to appeal the case to the Supreme Court. The Court has not imposed sentence on account of the stay in the proceedings. The defendant is to refrain from the practice of healing in any manner during the pendency of the stay.

The defendant was represented by Mr. W. E. Rowe, Crookston attorney, and by Mr. John I. Davis from Benson, Minnesota. Mr. Davis will be remembered as the lawyer who represented "Dr." Robert McGraw, negro quack who formerly operated at Winsted, Villard and Hewitt, Minnesota. Mr. Davis spent most of his time, in his arguments to the jury in the Luross case, denouncing the persecution of Luross and attributing it to the medical profession. In his argument to the

MEDICAL ECONOMICS

Court Mr. Davis contended that there was no Basic Science Board lawfully in existence, but Judge Montague overruled his objections and ordered the case submitted to the jury.

The case was tried for the State in a very splendid manner by Mr. Francis H. Stads vold, County Attorney of Polk County. Mr. Stads vold will be remembered by many members of the medical profession as the "Dobie" Stads vold of basketball fame at the University of Minnesota along about 1911. Mr. Stads vold was elected County Attorney of Polk County, Minnesota, in 1934, and he has been very successful in his court work.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners on Feb- ruary 13, 1936

By Examination

BALKIN, Samuel George, U. of Minn., M.B., 1935, Minneapolis, Minn.
BATTIS, Martin, Jr., U. of Mich., M.D., 1933, Rochester, Minn.
BELL, Elexious Thompson, U. of Missouri, M.D., 1903, Minneapolis, Minn.
BLAKE, James Alexander, U. of Minn., M.B., 1934; M.D., 1935; Hopkins, Minn.
BRYCE, William Fielding, Jr., Med. Col. of Va., M.D., 1934, Rochester, Minn.
BUSSEY, Charles Dan, Rush Med. Col., M.D., 1934, Rochester, Minn.
CAMPBELL, Samuel Joseph, Tulane U., M.D., 1933, Rochester, Minn.
CHEW, Eric MacMillan, U. of Pa., M.D., 1933, Rochester, Minn.
COHEN, Bernard Albert, U. of Minn., M.B., 1934, Minneapolis, Minn.
CRISLER, George Russell, U. of Chicago, M.D., 1931, Rochester, Minn.
DEEDS, Charles Douglas, U. of Cincinnati, M.D., 1934, Rochester, Minn.
DENNIS, Clarence, Johns Hopkins, M.D., 1935, Minneapolis, Minn.
ECKSTEIN, Arthur W., Northwestern, M.D., 1912, Mankato, Minn.
ELKINS, Earl Cook, Geo. Washington U., M.D., 1933, Rochester, Minn.
FAIRCHILD, Robert Durkee, Rush Med. Col., M.D., 1934, Rochester, Minn.
FARTHING, John Watts, U. of Pa., M.D., 1933, Rochester, Minn.
FRIEDEL, Hymen Louis, U. of Minn., M.B., 1935, Minneapolis, Minn.
GARRETT, Leslie Moyers, Vanderbilt U., M.D., 1933, St. Paul, Minn.
GUERNSEY, Chester Meredith, U. of Minn., M.B. and M.D., 1934, Rochester, Minn.
GUNDERSON, Harold Julian, Northwestern U., M.B., 1933; M.D., 1934; Rochester, Minn.
HALL, Byron Ellsworth, U. of Pa., M.D., 1933, Rochester, Minn.
HAMMAR, Lawrence Michael, U. of Minn., M.B., 1935, Minneapolis, Minn.
HEFFNER, Reid Russell, Johns Hopkins U., M.D., 1931, Rochester, Minn.
INGHAM, Donald William, Temple U., M.D., 1933, Rochester, Minn.
JACOBS, Lewis Grant, Jr., Stanford U., M.D., 1932, Minneapolis, Minn.

KERR, Jack Graves, Baylor U., M.D., 1931, Rochester, Minn.
KOSCHNITZKE, Herman Kaiser, U. of Minn., M.B., 1935, Minneapolis, Minn.
LEEMHUIS, Glenn H., U. of Minn., M.B., 1935, St. Paul, Minn.
LEMON, Robert George, U. of Ill., M.D., 1935, Rochester, Minn.
LOVELADY, Sim Bedford, Tulane U., M.D., 1934, Rochester, Minn.
MacKENZIE, Walter Campbell, Dalhousie U., M.D., 1933, Rochester, Minn.
MAKSIM, George, Jr., Temple U., M.D., 1933, Rochester, Minn.
MARCLEY, David McMillan, U. of Minn., M.B., 1934; M.D., 1935; Rochester, Minn.
McEWAN, Alexander, U. of Pittsburgh, M.D., 1933, Rochester, Minn.
McLENNAN, Charles Ewart, U. of Minn., M.B. and M.D., 1934, Minneapolis, Minn.
MEDOF, Sidney Howard, U. of Minn., M.B., 1935, Minneapolis, Minn.
MURPHY, Edmund Patrick, McGill U., M.D., 1935, Minneapolis, Minn.
O'BRIEN, William Martin, St. Louis U., M.D., 1933, St. Paul, Minn.
PEARSON, Malcolm Montieth, U. of Minn., M.B., 1935, Minneapolis, Minn.
PETERSON, Stanley Carl, U. of Minn., M.B., 1935, Minneapolis, Minn.
REIMANN, Hobart A., U. of Buffalo, M.D., 1921, Minneapolis, Minn.
RICHEY, Granville Leon, Indiana U., M.D., 1934, Rochester, Minn.
RILEY, John Branson, U. of Minn., M.B. and M.D., 1934, Big Fork, Minn.
RHORER, Roger Jerome, Northwestern U., M.B., 1933; M.D., 1934; Rochester, Minn.
ROSENBERG, Edward Frank, Jefferson Med. Col., M.D., 1934, Rochester, Minn.
SHELDEN, Charles Hunter, U. of Pa., M.D., 1932, Rochester, Minn.
SIMPSON, Wyatt Collier, Harvard U., M.D., 1931, Rochester, Minn.
SMITH, Caleb Howard, U. of Pa., M.D., 1933, Rochester, Minn.
SNYKER, Omer Edward, Loyola U., M.D., 1935, Ely, Minn.
SODERSTROM, Edwin Morris, Stanford U., M.D., 1931, Rochester, Minn.
STONE, Samuel Newton, Jr., U. of Pa., M.D., 1932, Rochester, Minn.
WEINER, Harry, U. of Minn., M.B., 1932; M.D., 1933; Fort Lincoln, N. D.

By Reciprocity

FERGUSON, William Cyril, U. of Neb., M.D., 1934, St. Paul, Minn.
KRUSEN, Frank Hammond, Jefferson Med. Col., M.D., 1921, Rochester, Minn.

National Board

BIRGE, Henry Leonard, U. of Pa., M.D., 1933, Rochester, Minn.
HEDLUND, Charles John, U. of Wash., Mo., M.D., 1934, Cambridge, Minn.
RICE, Hagbart Goetz, U. of Minn., M.B. and M.D., 1935, Moorhead, Minn.

OF GENERAL INTEREST

Dr. Mary L. Ghostley has been reappointed Superintendent of the Lake Julia Sanatorium, Puposky, Minnesota.

* * *

Dr. E. W. Senn of Owatonna was recently unanimously re-elected as head of the school board in Owatonna.

* * *

Dr. L. H. Hedenstrom of Cambridge has returned to his practice following a three months' sojourn in Denver, Colorado.

* * *

Dr. E. A. Heiberg of Fergus Falls, who has been seriously ill for several weeks at St. Luke's Hospital, Fergus Falls, is reported to be recovering.

* * *

Dr. U. S. Anderson, recently of the Nicollet Clinic, Minneapolis, has become associated with the Austin Clinic, where he will specialize in surgical work.

* * *

Dr. E. M. Hill, who has practiced for the last few years at Rushford, Minnesota, has moved to Big Timber, Montana, where he will continue the practice of medicine.

* * *

Dr. H. W. Havel has reopened his medical offices in Jordan following a six months' stay in Kansas, where he served as post physician at one of the army posts for that period.

* * *

The Mantoux test has been given by the local profession in Stillwater, Minnesota, to the Senior and Junior students in the high school. This is a regular yearly procedure.

* * *

Dr. G. W. Bohl of Ada, Minnesota, has purchased the former residence of Dr. Holmes, which he and Mrs. Bohl will occupy as a residence and where he will have his professional offices.

* * *

The University Hospital has recently acquired a new hypertherm machine made available through a grant from Charles F. Kettering of Dayton, Ohio, and the medical work of Dr. Walter Simpson.

* * *

Dr. E. J. Tanquist, head of the Douglas County Hospital, Alexandria, Minnesota, has returned from Chicago, where he spent several weeks at the Cook County Graduate School in the study of urology.

* * *

Dr. Joseph S. Emond, graduate of the University of Minnesota, 1933, recently completed a two-year post-graduate course and will practice in Farmington, Minnesota, where he established offices last month.

* * *

Dr. M. G. Ericsson, a graduate of the University of Minnesota medical school, 1934, who has been located in Chicago, Illinois, the past year, has opened offices in Long Prairie, Minnesota, for the practice of medicine in that community.

Dr. L. M. Roberts of Little Falls suffered a broken shoulder and fractured ribs Friday, March 6, when the airplane in which he was taking a patient to Rochester, Minnesota, crashed near Sleepy Eye. Dr. Roberts, according to last reports, is recovering nicely.

* * *

On invitation of local Ophthalmological Societies in Louisville, Nashville and Atlanta, Dr. Charles N. Spratt of Minneapolis demonstrated, by means of motion pictures, his method of operating for cataract and glaucoma, at meetings held March 12, March 16 and March 26.

* * *

Special courses in public health work have been established at the University of Minnesota beginning with the spring quarter. These courses have been made possible through receipt of a gift of \$13,250 from the United States public health service early in March for that purpose.

* * *

Dr. J. A. Myers, Minneapolis, is giving a series of lectures on tuberculosis before the following organizations this month: California Tuberculosis Association, Sacramento, April 2; Oregon Tuberculosis Association, Portland, April 3; Nebraska Tuberculosis Association, Lincoln, April 6.

* * *

Dr. A. J. Lenarz, a graduate of the University of Minnesota, who has been practicing in Sauk Rapids, since July, 1935, has moved to Browerville, where he has taken over the practice of Dr. M. E. Mosby. Dr. Mosby has purchased the hospital at Long Prairie, Minnesota, where he is now located.

* * *

According to a recent report of the U. S. bureau of census the operation and maintenance of the health department in Minneapolis for 1934 cost \$1.85 per capita, the total cost for the year being \$885,131. On the basis of the per capita cost Minneapolis ranked fourth among thirteen cities of comparable size.

* * *

Through the activities of the Washington County Medical Society and the P. T. A., a hearing survey has been conducted by Dr. Horace Newhart of Minneapolis in the Stillwater, Oak Park, and Bayport schools. Altogether, 2,083 tests were made, of which 152 showed more or less defective hearing. The School Board is assuming the expense of this survey.

* * *

Dr. Raymond B. Allen, former fellow in urology at the Mayo Foundation, has been appointed dean of the Detroit College of Medicine, Detroit, Michigan. Dr. Allen, a graduate of the University of Minnesota, received his Ph.D. fellowship at Rochester, Minnesota, in 1933. He has been associate dean of Columbia University medical school since 1934.

* * *

Word has been received of the death of Dr. A. E. Pierce of Minot, North Dakota, who passed away March 16. Dr. Pierce received his degree in medicine at the University of Minnesota in 1924 and following several years of post-graduate study in Europe located

OF GENERAL INTEREST

first in Kansas City, Missouri, and then in Minot. He is survived by his wife, his parents and one sister.

* * *

Dr. C. G. Ochsner has returned to Wabasha, Minnesota, to resume his general practice of medicine and surgery in copartnership with Dr. B. J. Bouquet. Dr. Ochsner went to Chicago last December to become associated with Dr. Andre Stapler. The sudden death of Dr. Stapler terminated this association and Dr. Ochsner decided to return to his former location in Wabasha.

* * *

Largely through the efforts of Dr. J. H. Dudley of Windom, Minnesota, chairman of the Cottonwood County Public Safety Commission, his county has won a bronze award for a low traffic accident fatality rate with credit for traffic accident prevention work in 1935. The presentation of the awards will be made by the Minnesota Public Safety Commission at a dinner meeting in Saint Paul, Tuesday, April 14.

* * *

Dr. J. J. Gelz and Dr. W. T. Wenner of St. Cloud have announced the association of Dr. Joseph B. Gaida with them in the practice of eye, ear, nose and throat work. Dr. Gaida is a graduate of the University of Minnesota, 1931, and has practiced at Kilkenny, Minnesota, before taking postgraduate work in eye, ear, nose and throat at the University and later serving as house surgeon for the same diseases at Ancker Hospital, Saint Paul.

* * *

With the heavy fall of snow experienced in the last few weeks in Minnesota several stories concerning the experiences of the country doctor in getting to his patients have been received. Dr. J. C. Feuling of Bovey was obliged to use snow shoes to get to a patient living on a farm off the main highway. Another doctor in Albert Lea drove through a blinding snowstorm as far as was possible in his automobile and then used horses and a wagon to bring his patient back to the highway and thence by automobile to the hospital. Others are reported using special sleigh runners on automobile bodies to traverse the drifted roads and byways. The vicissitudes of the pioneer doctor are still present in the country districts, it seems.

* * *

Extension Course in Refraction

A four-weeks' course in Elementary Refraction, designed especially to appeal to rural medical practitioners (graduates of medicine, only) who might wish to supplement their general practice in medicine by work in the field of refraction and physiologic optics, will be given May 4 to 30, 1936, at the University Medical School, provided a sufficient number of registrations is received. This course will be under the supervision of the Department of Ophthalmology. The registration will be limited to ten physicians. In addition to formal instruction in refraction, provision has been made to give participating doctors opportunity to examine patients at the Wilder Foundation in St. Paul and at the University, Ancker and city outpatient clinics.

The fee for the course of four weeks will be \$80.00, \$50.00 to be deposited with the application, \$30.00 on

registration. Applications and reservation fees should be sent in immediately. Reservation fees will not be returned once a place is held for any applicant although, if a substitute reservation is made, transfer of the application fee may be arranged. Registration fees should be paid by April 27.

Further information may be obtained from Dr. R. R. Price, Director of University Extension, University of Minnesota.

* * *

Dr. Scofield Honored

Dr. C. L. Scofield of Benson was honored with a testimonial banquet sponsored by the Benson Chamber of Commerce, Monday evening, March 9, 1936, commemorating his fifty years of service as a physician and his outstanding community service during forty-six years of residence in that city. Dr. W. A. O'Brien, associate professor of pathology at the University of Minnesota, gave the principal address. Dr. A. J. Chesley of the Minnesota State Board of Health, and Dr. E. A. Meyerding, secretary of the State Medical Association, both co-workers of Dr. Scofield in state public health work for many years, gave short talks, as did Mayor George S. Tait and Dr. Oscar Daignault of Benson.

Dr. Scofield became interested in public health work in 1906 and was one of the organizers of the Minnesota State Sanitary Conference that year. He has been a member of the Minnesota Public Health Association since its organization in 1907 and served as president from 1919 to 1923. Dr. Scofield served as a member of the State Board of Health for twelve years and was president of the Board for four years. He has been a member of the House of Delegates of the State Medical Association for twenty-five years and served as secretary of the Swift-Kandiyohi-Meeker Medical Society for several years. He has served as county health officer, city health officer, school physician, local surgeon for the Great Northern Railway, county coroner and as chairman of the public health committee of the Red Cross.

In addition to his interests in the health of his community Dr. Scofield has been active in many civic organizations. He was president of the village council in 1897, when the first water tower was built and the sewer system was widely extended. He is recognized as the father of the Benson park system and served on the park board for a number of years. He was chairman of the charter commission that in 1908 drew up the city charter which is still in effect. He was a member of the Board of Education for fifteen years, acting as president at one time.

His activities include Boy Scout work, organization of the Swift County Historical Society, participation in the promotion of athletic activities in the community and membership in numerous clubs and lodges.

Dr. Scofield was born on a farm near Cannon Falls, Minnesota, April 16, 1865, and will celebrate his seventy-first birthday this month. His medical education was received at the University of Iowa, where he was graduated in 1886. He started to practice in Saint Paul but moved to Benson in 1890, where he has practised ever since.

OBITUARY

Walter Jay Richardson
1856-1936

DR. W. J. Richardson died at his home in Fairmont, Minnesota, on February 20, 1936, at the age of seventy-nine, having practiced in Fairmont for forty-five years. He had been in failing health since last spring when he fell and sustained fractures of his lower vertebrae.

The great grandson of Benjamin A. Richardson, a soldier in the Revolutionary War, Walter Jay Richardson was born near Rochester, New York, November 17, 1856. He attended Carleton College, Northfield, Minnesota, and later received his A.B. degree from Amherst College. He began the study of medicine, in 1882, at Harvard, where he was a student under Dr. Oliver Wendell Holmes. He later attended the College of Physicians and Surgeons in New York, where he received his M.D. degree in 1885.

He began practice in Minneapolis but later moved to Hutchinson and from there went to Fairmont, where he established a prosperous practice.

Besides his wife, Dr. Hutchinson is survived by three children, Mrs. William Simpson of Silver Lake township; Mrs. Lawrence Cowdray of Syracuse, New York, and D. B. Richardson of Fairmont. One daughter, Lydia, died in infancy, and a son, Ralph, died some years ago, in New York.

Verner Paul Johnson
1902-1936

DR. Verner P. Johnson, physician at Delano, Minnesota, for the past seven-years, died Wednesday, March 18, 1936, at Fairview Hospital, Minneapolis, where he had been a patient for several weeks.

Verner Paul Johnson was born in Minneapolis, February 16, 1902, the son of Charles and Ida Blomberg Johnson. He was educated in the Minneapolis schools and graduated from South High School in 1919. He then engaged in teaching a village school in South Dakota and in 1920 enrolled as a student in medicine and surgery at the University of Minnesota, graduating in 1926. He served his internship at the New York Naval Hospital, where he was commissioned as a medical officer with the rank of lieutenant and after one year was transferred to China and spent eighteen months in the Orient. He was then transferred to the Great Lakes station, where he resigned his position.

Dr. Johnson located in Delano in 1929, where he practiced until the time of his death. He was a member of the Minnesota State Medical Association and president of the Wright County Medical Society.

In 1927 Dr. Johnson married Eleanor Downknot, who with two sons, Robert Paul and George Burton, survives him. He is also survived by his parents, Mr. and Mrs. Charles Johnson of Minneapolis, a brother Carl, and a sister, Mrs. Astrid Griffin, also of Minneapolis.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for April

The Minnesota State Medical Association broadcasts weekly at 10:00 A.M. every Monday over Station WCCO, Minneapolis and St. Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

- April 6—Hay Fever
- April 13—Rheumatic Fever
- April 20—Narcolepsy
- April 27—Sore Mouth

Wabasha and Winona County Joint Meeting

The eleventh annual dinner tendered by the Sanatorium Commission, and the fifth annual joint meeting of the Wabasha and Winona County Medical Societies was held at Buena Vista Sanatorium, Wabasha, Monday evening, March 16. There were thirty-three in attendance. Dr. C. G. Ochsner, president of the Wabasha County Medical Society, presided as toastmaster.

The following program was presented:

"Some of the Problems of the Minnesota State Medical Association"—Dr. W. W. Will, President of the State Association, Bertha.

"Social Security Programs Pending in Minnesota"—Mr. R. R. Rosell, Saint Paul, substituting for Dr. E. A. Meyerding.

"Practical Treatment of Anemias"—Dr. Charles H. Watkins, Rochester.

"Infectious Mononucleosis"—Dr. Frank J. Heck, Rochester.

Previous to the dinner, a short special session of the Wabasha County Medical Society was held, at which time Dr. B. J. Bouquet of Wabasha was admitted to membership.

Washington County Society

The second fracture lecture sponsored by the Washington County Medical Society was given on February 11, by Dr. Victor Hauser of St. Paul. Dr. Hauser outlined the diagnosis, treatment, and prognosis in fractures and injuries to the knee, leg, and foot. He showed a large number of x-rays, pointing out the difficulties of treatment and also the ultimate results.

The third fracture lecture was given on March 10 by Dr. Alexander Colvin of St. Paul, who took up fractures and injuries to the head. He quoted several authorities, pro and con, diagnosis and treatment, but mostly cited his own large experience with such injuries. He especially dwelt on the difficulty of making diagnosis from symptoms and emphasized the value of x-ray and spinal puncture and of a careful watching. Dr. Colvin also stated that no treatment, surgical or otherwise, would have been of any avail in patients dying from injuries six hours after such injury had been sustained.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Minnesota State Medical Association

The eighty-third annual meeting of the Minnesota State Medical Association will be held in Rochester, Minnesota, May 3, 4, 5, and 6, 1936, with headquarters at the Kahler Hotel. The tentative program for the meeting is as follows:

PROGRAM

Business Session

KAHLER HOTEL.

Sunday, May 3

Council
Reference Committee

Sunday Evening

House of Delegates

Monday, May 4

Council

Tuesday, May 5

House of Delegates
(Luncheon)
Council

Wednesday, May 6

General Assembly

Presentation of Officers

Scientific Session

Monday, May 4

Morning Session

Clinics by the Mayo Staff
Scientific Demonstrations and Exhibits
The Cancer Problem
Speaker to be announced.
Citizens Aid Society Memorial Address
Luncheon

Afternoon Session

Functions of the Spleen

LEON ASHER.....Berne, Switzerland
Professor of Physiology, University of Berne
Director of the Physiological Institute of Berne

Foreign Bodies and the Use of X-ray Examination in their Localization and Removal

WILLIS F. MANGES.....Philadelphia
Russell D. Carman Memorial Lecture
Minnesota Radiological Society, Sponsor

The Treatment of Gall Tract Disease as Determined by the Stage of its Development and the Patient's General Condition

E. L. TUOHY.....Duluth

Scientific Demonstrations and Exhibits

Hay Fever Symposium on the Causes, Diagnosis and Treatment

C. O. ROSENDAHL, Ph.D.
R. V. ELLIS
H. B. SWEETSER, JR.
Minneapolis

Oxygen Therapy

O. E. LOCKEN.....Crookston

A Few Axioms in Dermatological Diagnosis

H. E. MICHELSON.....Minneapolis

Management of the Minor Ailments of Pregnancy

M. O. WALLACE.....Duluth

Congenital Heart Defects. Importance of Early Diagnosis

H. J. LLOYD.....Mankato

The Management of Appendicitis

E. A. REGNIER.....Minneapolis

Evening Session

8:00 P. M.

METHODIST CHURCH

Medical Economics Meeting

Presiding Officer, W. W. WILL, President

Address of Welcome

C. W. MAYO.....Rochester
President of the Olmsted-Houston-Fillmore-Dodge
County Medical Society

President's Address

W. W. WILL.....Bertha

The Women's Auxiliary

MRS. E. M. HAMMES, President-Elect.....St. Paul

Address

OLIN WEST.....Chicago
Secretary and General Manager of the American
Medical Association

Address

J. TATE MASON.....Seattle
President-Elect of the American Medical Association

Tuesday, May 5

Morning Session

Clinics by the Mayo Staff

Scientific Demonstrations and Exhibits

The Treatment of Diabetes

ELLIOTT P. JOSLIN.....Boston
Professor of Medicine, Harvard University
Medical School

Luncheon

Afternoon Session

Subject to be Announced

FERDINAND SAUERBRUCH.....Berlin, Germany

Studies in Water Balance, Dehydration and the Administration of Parenteral Fluids

F. A. COLLIER.....Ann Arbor
University of Michigan

The Rôle of Duodeno-jejunostomy for Duodenal Ileus and Duodenal Obstruction

G. A. EARL.....St. Paul

Scientific Demonstrations and Exhibits

Regional or Terminal Ileitis

O. J. HAGEN.....Moorhead

Barbiturates and Complementary Drugs for the Production of Obstetrical Amnesia and Analgesia

J. J. SWENDSON.....St. Paul

Blood Transfusion

E. N. PETERSON.....Eveleth

"Bumper" Fractures of the Tibia

O. J. CAMPBELL.....Minneapolis
Erythema Multiforma, Complicated by Severe Gastro-intestinal Disturbances and Hemorrhage from Mucous Membranes in a Primipara

W. G. WORKMAN.....Tracy
The Surgical Treatment of Hydronephrosis, a New Operation for the Relief of Uretero-pelvic Junction Stricture

F. E. B. FOLEY.....St. Paul
Changes in Aortic Shadows Following Injuries to the Spine

M. H. TIBBETTS.....Duluth

Evening Session

8:00 P. M.

THE ARMORY

Social Evening

C. W. MAYO, Presiding Officer

The entire exhibit of crime detection methods prepared by the Federal Bureau of Investigation of the United States Department of Justice has been sent here by J. Edgar Hoover, Director.

There will be a talk on crime detection methods by one of the Bureau's "G" men and an ample opportunity to inspect the exhibit.

This will be a social evening for members and their guests.

Wednesday, May 6

Morning Session

Clinics by the Mayo Staff

Scientific Demonstrations and Exhibits

The Surgical Aspects of Peptic Ulcer

DONALD GUTHRIE.....Sayre, Pa.
 The Guthrie Clinic, The Robert Packer Hospital, Sayre, Pa.

Luncheon

Afternoon Session

Diagnostic and Therapeutic Problems in Heart Disease in Children

M. J. SHAPIRO.....Minneapolis
Correlations Between Variations in Barometric Pressure and Incidence of Cerebral Hemorrhage

G. R. KAMMAN.....St. Paul
The Roentgen Findings in Biliary Fistula

L. G. RIGLER.....Minneapolis
Myxedema, Its Nervous and Mental Manifestations

G. N. RUHBERG.....St. Paul

Scientific Demonstrations and Exhibits

Ovarian Hemorrhage Simulating Acute Appendicitis

C. H. MEAD.....Duluth

Active Pulmonary Tuberculosis Without Symptoms

E. K. GEER.....St. Paul

Upper Abdominal Pain—Its Occurrence in Acute Gonorrheal Pelvic Inflammatory Disease

R. A. JOHNSON.....Minneapolis

Medical Question Court

W. A. O'BRIEN.....Minneapolis
 Chairman

A group of Eminent Specialists in the Various Lines will assist Dr. O'Brien

State Meeting Exhibits

The United States Army and Navy, as well as the Department of Justice, will be represented among the many outstanding exhibits arranged for the eighty-third annual meeting of the Minnesota State Medical Association in Rochester, May 4, 5 and 6.

The Army and Navy, both of which have officers stationed at the Mayo Clinic, will have an extensive exhibit featuring medical equipment and methods of treatment in time of emergency. There will be a demonstration by the inventor, Commander Joel White of the Navy, of apparatus to prevent carbon monoxide poisoning entering airplane cabins.

This exhibit will also include a demonstration of fitting army shoes with x-rays to show the effect on the feet when loads are carried on the back. This will be carried on under the supervision of army officers with Lieutenant-Colonel Henry W. Meyerding of the Mayo Clinic in charge.

A large hospital tent will be pitched on the grounds at St. Mary's hospital where the exhibit will be placed. Men will be on duty and ambulances at hand. Several rooms in the hospital will be occupied by the exhibit where small models of incinerators, sanitary equipment and dispensary equipment will be on display.

The exhibit should be of special interest to members of the medical profession now in the medical corps and also to those who go into rural sections where army methods are helpful. It is under the direction of Lieutenant-Colonel F. L. Smith.

A crime exhibit from the Bureau of Investigation, of which J. Edgar Hoover is in charge, will include finger-printing, ballistics and every phase of crime detection. An expert on crime from Mr. Hoover's department will talk on this subject at a special meeting Tuesday night in the Armory.

An especially interesting exhibit will be one on fever therapy by Dr. A. U. Desjardins and Dr. W. C. Popp. Charts and slides of this new method of treatment will be shown, and twice a day illustrated lectures will be given. Groups of six will be given an opportunity to visit the Fever Therapy Department at St. Mary's Hospital and to see the treatment actually being given to patients. Appointments must be made for these special visits.

An exhibit and demonstration of diagnostic tests, the Mantoux test, Dick and Schick tests and their interpretations will be put on by Dr. H. F. Helmholtz and the Committee on Public Health Education. Actual patients will be used for demonstration. In view of the importance of this phase of preventive medicine, attention of physicians is called to it at this time when expanded public health programs will make possible greatly increased immunization work in Minnesota.

Dr. Frank H. Krusen, Rochester, will have an exhibit on physiotherapy, and Dr. L. A. Buie will give daily lectures on proctology in connection with his exhibit including charts and wax models. There will be a large number of other interesting exhibits and scientific demonstrations.

PROCEEDINGS of the MINNESOTA ACADEMY OF MEDICINE

Meeting of February 12, 1936

THE regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, February 12, 1936. The meeting was called to order by the President, Dr. Thomas S. Roberts, at 8:10 p. m.

There were forty-four members present.

Minutes of the January meeting were read and approved. Dr. W. F. Braasch read the following Memorial to the late Dr. Judd, and a motion was carried that this be made a part of the permanent records of the Academy and a copy sent to Mrs. Judd.

Edward Starr Judd

1878-1935

With the death of Edward Starr Judd from pneumonia on November 30, 1935, the world lost one of its most outstanding surgeons and humanity one of its benefactors. Dr. Judd was born in Rochester, Minnesota, July 11, 1878, son of Edward F. and Emma J. Judd. He was educated in the public schools in Rochester, and received the degree of Doctor of Medicine from the University of Minnesota Medical School in 1902. He served his internship in St. Mary's Hospital in Rochester, and became first assistant to Dr. C. H. Mayo. Later he was appointed head of one of the sections in the Division of Surgery in the Mayo Clinic, as well as surgeon at St. Mary's Hospital. He was made Professor of Surgery in the Mayo Foundation Graduate School of the University of Minnesota in 1920. During the war he was director of the school of instruction for officers and enlisted men of the medical corps stationed in Rochester.

He was married to Miss Helen Berkman of Rochester in 1908, and she with their five children survive him.

Dr. Judd was a member of the Minnesota State Medical Association, the American Surgical Association, the Western Surgical Association, the Society of Clinical Surgery, the American Medical Association, the American College of Surgeons, the Interurban Surgical Association, the Southern Surgical and Gynecological Association, the Southern Minnesota Medical Association, the Minnesota Academy of Medicine, the Minnesota Pathological Society, the Association of Resident and Ex-Resident Physicians of the Mayo Clinic, Sigma Xi, Alpha Kappa Kappa, and was a member of several societies in foreign countries. He was given the degree of Doctor of Science by the University of Maryland in 1934.

Seldom has the loss of a physician caused such sincere and widespread sorrow among members of the medical profession and laity alike. There was a depth and sincerity in his personality which endeared itself to all who came in contact with him. He was unassuming in his manner and modest almost to self-effacement. If ever there lived a man who loved the truth and despised falsehood and pretension, it was Starr

Judd. He was a man's man and was most happy when among them. He was fairly worshiped in the circle of his intimate friends. A striking example of the unique popularity which he enjoyed among his colleagues was shown by his election to the presidency of the American Medical Association by virtual acclamation and against his wishes.

Apt pupil of the great masters of surgery, Doctors Will and Charles Mayo, he took full advantage of his opportunities. Because of his technical skill and sound surgical judgment he was generally regarded as one of the world's leading surgeons. He took keen interest in many of the younger men who had their training under him, many of whom have since become prominent surgeons. In keeping with his wide scientific interests, he spent much of his leisure time in recent years in following and encouraging the work carried on in experimental laboratories. His scientific contributions to periodical medical literature and to many textbooks number more than three hundred and have left a lasting impression on contemporary American surgery. These and the memory of his many fine qualities of mind and character will keep his influence alive for years to come.

The Committee: D. C. BALFOUR,
WALTMAN WALTERS,
WILLIAM F. BRAASCH.

The scientific program followed.

THE RELATION OF RETINAL CHANGES TO THE SEVERITY OF THE ACUTE TOXIC HYPERTENSIVE SYNDROME OF PREGNANCY

ROBERT D. MUSSEY, M.D.

Rochester

Dr. Mussey gave his Inaugural Thesis on the above subject.

Abstract

The changes occurring in the retina of women suffering from the acute toxic hypertensive syndrome of pregnancy, commonly called pre-eclamptic toxemia, have been noted by a number of observers. Evidence is presented from a number of investigators which indicate that in both the non-convulsive and convulsive forms of this syndrome there is a general systemic vascular change as revealed by a study of the pre-capillary vessels of the nail fold, the renal glomerular tufts, and the retinal arterioles.

Wagener has also stated that in cases of toxemia of pregnancy in which there is an associated rise in blood pressure, changes may be seen both in the retinal arterioles and in the retina proper. The changes in the arterioles appear first and those in the retina proper, commonly called "retinitis," are secondary to, and ap-

parently dependent on, the changes in the arterioles. The caliber of the arterioles appears narrowed and the lumen is reduced, because of spastic contraction and increased tonus of the walls of the arterioles. This change in the arterioles may disappear entirely if there is early and permanent fall in blood pressure. The constriction soon becomes fixed if the toxemia progresses. When the constriction of any arteriole becomes so fixed and severe as to cause secondary capillary ischemia or stasis, localized edema and hemorrhage appear in the adjacent retina. If the toxemia continues, this spastic constriction may become so generalized and severe as to produce diffuse retinitis of albuminuric type, the classic "retinitis of pregnancy nephritis." The presence or absence, or the advancement, of the involvement of the arterioles can be determined best by frequent systematic examinations of the retina.

Wagener's description of the retinal changes in cases of pre-eclamptic toxemia may be divided into four consecutive stages, dependent on the severity and duration of the hypertension accompanying the toxemia: (1) The first visible sign is spastic narrowing of the arterioles of the retina, which may affect all branches of the central artery. (2) Often there is irregular constriction of the lumen of the arterioles, usually first or more marked in the smaller nasal branches; this constriction may vary in degree or situation from day to day. (3) Later, as the narrowing and constriction become more fixed, individual cotton-wool patches and hemorrhagic areas may appear in the retina. (4) Diffuse retinitis of albuminuric type may develop.

Ophthalmoscopic examination of the retina was made in 108 cases, in ninety-eight of which there were no convulsions and in ten of which there were convulsions associated with the acute toxic hypertensive syndrome of pregnancy, commonly called pre-eclamptic toxemia and eclampsia. During hospitalization of all patients but one, the systolic blood pressure was recorded at 140 mm. of mercury or more, and urinalysis revealed albumin grade 2 or more. In one case the highest blood pressure was less than 140 mm. systolic. Judged by the highest systolic blood pressure, the patients were classified in groups similar to those used by Peckham in his study of nephritis following acute toxemia; namely, group 1 included patients whose systolic blood pressure was between 140 and 169 mm. of mercury; group 2, those whose systolic blood pressure was between 170 and 199 mm.; and group 3, those whose systolic blood pressure was 200 mm. or higher.

Using the grading of 1 to 4, according to Wagener's description of the changes in the retinal arterioles and the retina proper in the toxemias of late pregnancy arranged according to the highest systolic blood pressure, it is shown in Tables I and II and in Figure 1, that the severity of the changes demonstrated in the retina increased progressively with the height of the blood pressure. In group 1, only 12 per cent of the cases were graded as high as 2 or 3, and none was graded 4; in group 2, 48 per cent were graded 2, 3 or 4; and in group 3, 87.5 per cent were graded 3 and 4. One patient whose systolic blood pressure did not reach 140 mm., four whose systolic pressure remained under 150 mm., and ten others who had pressures remaining un-

der 160 mm., had spastic retinal arteriolar changes. This is evidence that a generalized vascular disturbance rather than a local condition, such as lowered renal function, is present in association with the mild as well as the more severe forms of pre-eclamptic toxemia. In cases in which the systolic blood pressure was less than 180, no changes of acute retinitis grade 4 developed.

It may be assumed that there is an angiospastic change in the systemic arterioles similar to that which may be seen in the retinal vessels. If the spastic constriction is mild and of short duration, the arteriole will probably return to normal. If the spastic contraction is more marked and is maintained over a significant period of time, actual organic changes are prone to occur. This may affect vessels in one part or organ of the body more than another, and permanent damage may be done to the general vascular system or to the vessels of the brain or the heart or the glomerular tufts, which may fail to recover completely.

With this in mind, it is to be noted that the routine, regular, sometimes daily, retinal examination of patients with the acute vascular syndrome of pregnancy is of practical value. As shown in Table IV, labor was induced in forty-seven cases; the percentage of induction showed a rise parallel to both the rise in systolic blood pressure and to the severity of the retinal changes. In addition to readings of blood pressure, urinalysis and evaluation of the symptoms, changes observed in the arterioles of the retina furnish a valuable index of the degree of injury to the general vascular system and the rate at which this injury is progressing. In a number of cases the change in the retina is the deciding factor in determining if, and when, to terminate pregnancy.

In 72 per cent of 108 cases in which the systolic blood pressure was 140 mm. of mercury or more, positive evidence was found of more or less change in the retinal arteries or in the retina proper. As a rule, changes in the retina which at first consisted of spastic narrowing of the retinal arteries, revealed a definite increase in degree and severity, with the increase in the height of the systolic blood pressure and the duration of the toxemia. The first appearance of cotton-wool exudates and hemorrhages in the retina indicates the danger of permanent arteriolar injury; in the presence of such retinal changes, pregnancy should be terminated promptly.

Discussion

Dr. W. H. CONDRIT (Minneapolis): I thoroughly enjoyed this paper and wish to commend Dr. Mussey on this excellent survey. It recalls to memory a report before this Academy by Dr. William Murray, several years before his death, on the study of a series of patients with retinal changes in pregnancy. His series did not deal solely with patients in some degree of toxemia, but a group taken at random, including so-called normal pregnancies, if there is such an "animal." He found that practically every patient sometime during her pregnancy had some retinal changes that might to a greater or lesser degree affect her vision; but he left the impression with me that, even though my patients

come in complaining of headache or slight disturbance of vision, I should have no great concern or make any change in their lenses if they are wearing glasses, in order to protect them or increase their comfort through that particular pregnancy; that Nature is very kind and sooner or later would restore the vision to normal after delivery.

So little is known of the cause of the various toxemias of pregnancy that we cannot feel disappointed that Dr. Mussey did not discuss the etiology of these retinal changes. Every pregnant woman changes in her physiologic chemistry to a greater or lesser extent. I am reminded of one patient I had who was in her first pregnancy. Within the first month of pregnancy her urine showed positive albumin. She had a history of a very severe scarlet fever in years past but had had no recent urinalyses, so I had no idea of the kidney function at the time of her marriage. She was an obstinate creature and would pay no attention to her diet. The albumin increased and her blood pressure began to rise. When it reached 200 systolic and her vision was practically gone, I felt that the uterus should be emptied. After consulting with her husband and parents they consented to induction of labor at seven months. At that time she was totally blind. She recovered and in about six months her vision was restored.

After that I was at Lying-In Hospital taking work with Dr. Markou. I told him about this patient and asked him when he thought it would be safe for her to conceive again. He said, at any time after her kidney repairs and blood pressure and vision returned to normal. He remarked that it might have been a beefsteak or some specific food—in other words, a food allergy—that threw her off balance and started her in the toxic state. Afterward I delivered her of a boy and a girl two years apart. She escaped any untoward complications with both and had no hypertension or toxic manifestations in either of these pregnancies.

DR. R. T. LAVAKE (Minneapolis): This is a most interesting and stimulating paper. Nothing can be added from the standpoint of pathologic changes in the retina but one may in discussion emphasize again the importance of watching for this retinal pathologic change as soon as we have the slightest suspicion of a beginning toxemia. This paper tends to strengthen the feeling of many of us that the advocates of non-intervention fail to consider the possible permanent damage to the mother even though one may be successful in saving the lives of mother and child. The case Dr. Condit mentioned redounds to the credit of his good judgment. He terminated pregnancy. Had he allowed the pregnancy to go on, as would the advocates of the non-intervention school, he might have lost mother and baby; or, instead of returning to normal, the mother might have been permanently damaged. I cannot help but feel that the advice given him regarding her future safety, though borne out by success in this instance, was over-optimistic. It has been my experience that patients showing retinal changes must be most carefully watched and checked before being advised that it is safe to become pregnant again.

Eye ground examinations at times furnish a clear indication for the advisable termination of pregnancy where blood pressure and urine indications are still not compelling. On the other hand, many of the worst cases of eclamptogenic toxemia show few if any eye ground changes, and this fact has led some men to minimize the importance of ophthalmoscopic examinations.

I would like to ask Dr. Mussey a question. Do I understand correctly that he considers retinal changes grades 1 and 2 are not in themselves an absolute indication for the termination of pregnancy, but that types 3 and 4 are absolute indications? Such a judgment would correspond to my experience.

DR. MUSSEY (closing): I wish to thank Dr. Condit and Dr. LaVake for their generous remarks. I think Dr. Condit is quite right in calling attention to the visual changes that a lot of pregnant women have. We were concerned here with the ophthalmic examination of toxic patients. As far as etiology is concerned, nobody knows much about the toxic factor. Ophthalmologists who have more knowledge than I have about it, feel that the spastic constriction of the arteriole, if it lasts long enough, will produce ischemia and edema and hemorrhages in the retina and may proceed to retinitis; this spastic constriction may be the etiologic factor producing the changes in the retina.

We feel that changes in the retina are merely an index of what is taking place in the arterioles throughout the body and, if there are changes in the arterioles of the retina, there may also be similar changes and hemorrhages in other organs. We have had such patients as the one whose case Dr. Condit reports. I recall several years ago a young woman who had complete loss of vision due to edema and separation of the retina. Following delivery, vision returned to normal and she had two subsequent normal pregnancies. If patients have systolic blood pressures of 200 or more and the pressure remains greater than 200, in the large majority of instances arterial damage will be produced; if not to the kidney or the eye, to arterioles somewhere in the body.

In regard to Dr. LaVake's discussion about routine eye examinations, we find that the ophthalmoscopic examination is of definite value in the hypertensive toxemias of pregnancy. We do not feel that induction of labor is often indicated for the patient who has a grade 1 or 2 change in the retinal arteries because she has not yet begun to have cotton-wool exudates or retinal hemorrhages. If the blood pressure is extremely high or if the symptoms are severe, labor may be induced even when there are no ocular changes; but, in the presence of ocular changes, even with a lower blood pressure, we have learned that frequent examinations by the ophthalmologist may reveal hemorrhages in the retina. When retinal hemorrhages appear, one cannot say they have not occurred elsewhere in the body. For this reason, when the retinal lesions are advancing, or if retinal changes are reached up to grade 3 or 4, even if the blood pressure is no higher we proceed with measures to terminate the pregnancy.

PNEUMATIC RUPTURE OF THE BOWEL

ARTHUR W. IDE, M.D.

Saint Paul

In 1904 W. G. Stone of London reported the first case of pneumatic rupture of the intestines. Since that time, probably due to the fact that compressed air is being used more extensively, there have been more of these injuries reported. There have been forty-four of these cases reported in the literature up to date. This indicates the rarity of this accident. During the last three years, so far as is known, there has been none of these accidents, probably because of instruction of the danger and because of "safety first" agitation.

There have been three papers written besides several reports of cases. The first work on this subject was done by Dr. Willis Andrews. He reported one case of his own and collected other unpublished cases. The second paper appeared in 1914 by Bendixon and Blything. They reported one case of their own and collected seven other unpublished cases. Burt, in 1931, reviewed this subject and brought the number of cases up to that date. He reported one case of his own and referred to three other unpublished cases. Burt also listed all the published cases. This brought the total number to forty-four. Burt and Andrews did a considerable amount of work to ascertain the amount of pressure necessary to cause this injury. They experimented on bowel removed from animals and from cadavers.

This communication of ours reports one case of our own and adds twenty-four other unpublished cases to the forty-four cases that have already been published. This brings the total number to sixty-eight.

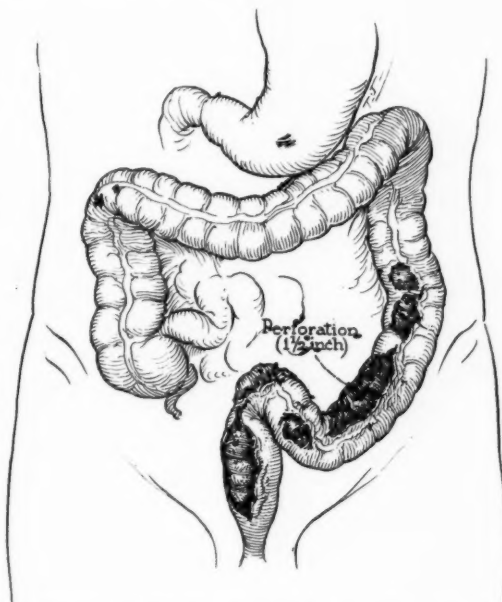
Our case of pneumatic rupture of the bowel came under observation on September 11, 1930. The victim was a car repairer employed by the Northern Pacific Railway. He was admitted to the hospital by ambulance at noon on September 11, 1930. The patient stated that he had a sudden attack of abdominal cramps which came on while at work one hour earlier. His past history was normal. He had never had gastro-intestinal disturbances of any kind. While x-ray pictures were being taken, the patient reluctantly admitted that earlier in the day he had turned the compressed air on a fellow workman and that at the time of the accident the fellow workman had retaliated by placing the nozzle of the hose near the patient's anus and released the air. This caused the severe cramps and, as the patient stated, "It filled me up with air." The cramps were soon followed by vomiting and urinary urgency.

The patient presented a picture of a serious abdominal condition. His pain was intense. His face was pale and gave an anxious pinched expression. The abdomen was markedly distended and tympanitic. There was diffuse tenderness and board-like rigidity. His pulse and respiration were rapid. His white blood count was 10,600. A roentgenogram showed free gas under the diaphragm.

A diagnosis of pneumatic rupture of the bowel was made, and immediate operation advised.

The patient was operated on three hours after the accident, under spinal anesthesia. The incision was along the outer border of the left rectus muscle. When the peritoneum was opened, gas escaped. The sigmoid was found perforated at about its midpoint. In addition, there were extensive lacerations of the serous coat of the sigmoid and the descending colon. The

damaged bowel was repaired. The peritoneal cavity was cleaned out as well as possible. Two flat rubber drains extended into the pelvis.



Perforation of sigmoid with extensive laceration extending well up on the descending colon.

My first group of cases consists of four which occurred accidentally. All four patients died. Two of them were operated upon.

Case 1.—With some other companions, L. F., aged twelve, was playing in the car shops of a railroad. They had been running and playing, and this boy got tired and sat down on the end of a pipe that was sticking out of the ground. One of the other boys, age about twelve years, kicked open the valve on the pipe. The pipe was connected with the compressed air apparatus and when the valve was kicked open the child was blown off. The end of the pipe was over the anus. The compressed air was introduced into the rectum and bowel. He was taken at once to the hospital, where an emergency operation was performed, but he died the following afternoon. The rectum, sigmoid, and a portion of the descending colon were badly torn and ruptured.

Case 2.—A machinist while at work was leaning over to adjust a nut. His fellow workman went behind him with an air hose and the nozzle came in contact with the patient's rectum. The patient immediately became violently sick. He was removed to a hospital and was operated on at once. A tear was found in the lower end of the sigmoid about 2.5 inches long. The sigmoid above this tear was contused and the outer coat of the bowel was bruised. The patient died the following day.

Case 3.—This patient was a machinist in the employ of a railway company. This is another case where the air hose in the hands of a fellow employee came near the victim's anus and the air was forced into the rectum under pressure. He sustained a rupture of the bowel and died. No operation was performed.

Case 4.—On February 1, 1920, a blacksmith helper, C. R., an employee of a railway company, was fatally injured when an employee accidentally put the nozzle of the air hose against the victim's rectum. The pa-

tient sustained a perforation of the bowel. In this case the patient died two days after the accident.

The second group of five cases occurred during the act of one man dusting another off with the use of the compressed air hose. Four of them died and one lived. Two of them were not operated upon.

Case 5.—On Oct. 29, 1918, a boy sixteen years of age was working in a railroad shop together with other employees. He was cleaning up after a day's work and they were using compressed air to blow the dust off their clothing. The boy asked a negro to blow the dust off his clothing. The negro then applied the nozzle of the hose between the boy's legs, and the air penetrated the colon. He was taken immediately to the hospital but died shortly afterward. There is no record as to whether or not an operation was performed.

Case 6.—(Dr. John R. Nilsson has furnished me with the following case.) G. D. was injured on May 30, 1926, when fellow employees were dusting off their clothing with compressed air. The nozzle of the hose was pointed at the victim's anus. He suffered cramps and distention. He was treated in the hospital, where he died six days after injury. There was no operation and no autopsy.

Case 7.—This patient was a machinist helper, aged twenty-one, and was injured on June 1, 1914. A fellow employee was brushing him off with an air hose. The nozzle of the hose was placed near the anus and the air was forced into his rectum, causing a rupture of the bowel. The patient was operated upon but died the following day.

Case 8.—A boilermaker in the employ of a railway company was blowing the dust off the coat of a fellow workman at the latter's request. In doing this the nozzle of the air hose was placed near the rectum while the victim was bent over. The injured man sustained a perforation of the bowel and died shortly afterward from shock.

Case 9.—On July 15, 1929, H. W., a railway employee, was injured when the nozzle of an air hose was directed against the anus by a fellow employee when he was dusting him off. The resulting injuries, due to forcing compressed air into the rectum, were not of a serious nature. The patient returned to work ten days after the accident.

The third group of thirteen cases occurred as an example of pranks or "horse-play." Three of these lived and ten died.

Case 10.—(This case was reported in the Bulletin of the Moses Taylor Hospital, Scranton, Pennsylvania. It occurred in the service of Dr. J. M. Wainwright, to whom I am indebted.) The report reads as follows: "The patient, an oiler in a car shop, was climbing up a ladder. A second workman held the nozzle of an air hose against his anus and turned on the air pressure. The air hose nozzle was three-eighths of an inch in diameter and had about ninety pounds of pressure back of it. He does not remember whether the nozzle was pressed against him, but thinks in having his thigh flexed on the ladder the air was able to enter more easily. He was wearing overalls, trousers and underwear, with no holes in any of them. He felt a sudden severe pain immediately when the air was turned on, and he says he could feel the air filling up his abdomen. His fellow workmen walked him about, hoping to remove some gas, and then put him in an automobile and gave him a ride as their first treatment had not been a great success. He was seen two hours after the injury. The abdomen was unusually hard, much harder than in the average case of peritonitis. Owing to failure to appreciate the possibilities, the patient was given a turpentine enema. An operation was done six hours

after the injury. When the peritoneum was opened, there was a loud escape of gas under high pressure, almost as loud as the report of a small automobile tire. The patient was given appropriate treatment and recovered."

Case 11.—This patient was a car cleaner. While bending over to see if the car windows were closed, a fellow employee stuck the nozzle of an air hose near his anus. He was taken to the hospital immediately after the injury and was operated upon. Lacerations were found around his rectum and emphysema of the entire abdominal wall and side. A rupture of the colon and sigmoid was found. The patient made a good recovery.

Case 12.—This employee was engaged in pressing grease into cakes and was working in a stooped-over position when a fellow employee held the nozzle of a compressed air hose at or near the anus. Immediately the patient was seized with pain in the abdomen and fell to the floor. Air was aspirated from the abdomen. He died five hours after the accident. No operation was performed.

Case 13.—In this case a fireman on a locomotive placed an air hose against the anus of the engineer. The engineer was leaning out of the cab window looking ahead. There was a rip in the engineer's trousers, and the force of the air pressure literally blew this man up like a balloon. The patient lived about twenty-four hours and then died. There was no operation.

Case 14.—This patient was another railway employee. An air hose was held near the victim's anus and a rupture of the bowel was sustained. The patient died shortly afterward.

Case 15.—On May 30, 1936, an engine watchman sustained a rupture of the bowel due to compressed air. The accident occurred as the result of horse-play. The injured man died. There is no further record.

Case 16.—Mr. P., a mechanic in the employ of a motor truck company, was killed by an air hose accident. This was another case of horse play, and the accident occurred in the same manner as the preceding case.

Case 17.—This man, A. L., was fatally injured in the same way as practically all of these victims. A fellow employee applied the nozzle of an air hose against his rectum, with resultant rupture of the colon. The patient died from shock and peritonitis.

Case 18.—On March 24, 1915, a railway employee was injured as a result of horse-play with compressed air. The compressed air entered the rectum and ruptured the walls of the rectum. The victim died three hours after the accident.

Case 19.—On June 21, 1915, J. H., an employee of a foundry company, was fatally injured when during horse-play a fellow workman applied an air hose to his rectum.

Case 20.—On June 15, 1920, a foreman, as a practical joke, applied the nozzle of an air hose to the anus of one of his employees. The victim sustained a perforation of the colon from which he died eight days later. There is no record of operation.

Case 21.—On July 31, 1936, a car repairer received injuries to his intestines while a fellow employee held an air hose against the anus with 90 pounds of pressure. As in practically all these cases, there was marked distention of the abdomen with severe pain and extreme shock. This man was operated on, and died during the operation.

Case 22.—An employee was injured by compressed air entering the anus. The injuries were minor and no disability resulted.

The fourth group consists of three cases which are not given in detail. These patients all died.

Case 23.—This case occurred in the plant of a cereal

company. No details are available, but the result was fatal.

Case 24.—This is a case of rupture of the sigmoid due to the application of compressed air. The accident occurred in Atlanta, Georgia. No details are available.

Case 25.—A fatal injury occurred to an employee of a railway finishing material company. No details available.

We made some effort to investigate the experience of oil companies at their filling stations. One officer writes, "I have recently heard indirectly of a small boy who suffered this accident as the result of a practical joke with an air hose at a filling station with a fatal result. I do not know the details of this case nor how I can find them out."

We have a personal letter from the law department of one of our largest gasoline retail companies on this matter. They say they have never heard of such an accident. Probably the construction of the air nozzle at these filling stations is a great protection. However, undoubtedly these accidents have occurred at filling stations.

Compressed air is used extensively in industrial work for the purpose of transmitting power to drills, riveters, and other machinery. It is also used for cleaning the debris from inaccessible places as well as for paint spraying and sand blasting. The compressed air, under pressure of from 40 to 125 pounds, is piped to numerous places in industrial plants. The average person seems to have no comprehension of the danger of this force. It does not occur to them that there is any risk in directing this column of air against the body of another person. There appears to be some psychologic force that impels these men to direct this column of air at a vulnerable part of the body, namely the anus. Out of twenty-five cases, thirteen were definitely due to horse-play.

These victims were all fully clothed and the compressed air was forced through the clothing and into the rectum even though the nozzle of the hose was in some cases several inches from the anus. This is accounted for by various writers in two ways. In the first place, air under pressure from 100 to 125 pounds issuing from a hose, forms a solid column of air which acts as a solid body forcing open the sphincter muscles. In the second place, anatomic arrangements of the perineum are such that it acts much like a funnel in concentrating the air column at the anus. We might add that air under heavy pressure easily penetrated the smaller openings in clothing. The clothing does not seem to act as an obstruction in the column of air.

The column of compressed air emerging from the hose in these injuries finds the anal sphincter the point of least resistance and does very little damage on the outside. The real pathologic change is inside and concealed. For this reason, without an accurate history, most cases are considered as possible acute perforations from an ulcer or severe "colic" due to some other cause. It is interesting to note that a large number of these patients have been given an enema very early after admission. Marked distention of the peritoneal cavity with air is a characteristic feature of these cases. The presence of air can, of course, be demonstrated with x-ray.

In every case reported, the colon has been the viscus which has been torn or perforated. The sigmoid is in most cases the point of election for complete perforation. Usually there has been only one complete perforation of the colon with multiple tears of the outer coat of the bowel with bulging of the mucous coat. The reason for this perforation of the sigmoid, as Andrews has pointed out, is probably because the sigmoid flexure offers an added resistance to the air passing through the rest of the colon, and thus yields first to the unequal pressure. In most cases reported, the site of perforation and laceration is at the longitudinal band.

In this series of twenty-six unpublished cases, eighteen were fatal, five recovered, and in two cases we were unable to ascertain whether or not the patient had recovered. This is a high mortality rate and corresponds to Dr. Andrews' figures of 81.2 per cent.

As far as we could determine definitely, seven of the patients here reported were operated upon. Only five of the entire number of patients reported recovered. This would indicate that immediate operation is rewarded with favorable results and would markedly lower the mortality percentage.

The treatment of pneumatic rupture of the bowel is immediate laparotomy with repair of the lacerated bowel with drainage. In nearly every case reported, the rupture and laceration takes place in the sigmoid so that very little time need be wasted in exploration. For the same reason, the best approach is through the left rectus incision. In cases with enormous distention, resulting shock, and depression due to pressure, a needle may be inserted into the peritoneal cavity to gradually decrease the pneumatic pressure and relieve the patient to such an extent that operation may be successfully performed.

Conclusions

1. Clothing offers little resistance to air under pressure.
2. Rupture of the bowel is usually in the sigmoid with laceration of the outer coat of the colon.
3. Victims of this accident are apt to attempt to conceal the cause and thereby mislead the surgeon unless he bears in mind the possibility of pneumatic perforation.
4. Gradual release of intraperitoneal air pressure by means of inserting a hollow needle into the peritoneal cavity may be used to advantage to relieve shock and improve the patient as an operative risk. This may also be used as a diagnostic procedure.
5. Prompt diagnosis and early laparotomy offer the only chance of saving life in injuries of this nature.
6. The increasing use of compressed air in industrial work and its misuse by employees has increased serious and fatal accidents.
7. Strict rules covering the use of compressed air are in general use. Employees are promptly disciplined for any breach of these rules.
8. These are all potential claims. As far as we know, there has been no criminal action in connection with them.

BOOK REVIEWS

Discussion

DR. H. P. RITCHIE (Saint Paul): I might add a case to this group. The story is the same as those recited by Dr. Ide. A workman in a shop was bending over and another man placed an air-hose near the anus. The man immediately dropped over, but recovered sufficiently to be taken home. There he was given a soap-suds enema which did not return. Another enema with a liberal quantity of turpentine was given and, when this did not return, a doctor was called to the home, and, appreciating the situation, sent the man to St. Luke's hospital. He came into the hospital about six hours after the injury with the most remarkable abdominal distention I think I have ever seen. At operation both enemas were recovered. It was quite an experience to open that abdomen and be almost overcome with the odor of turpentine. A slit was found in the sigmoid which was closed, the abdomen drained and the man recovered.

The cases of compressed air injury to the bowel are in the same class as any other case of traumatic rupture. The peritoneum stands all kinds of insult with recovery providing the irritation is not present too long. The time element between injury and treatment is the most important factor in recovery.

DR. IDE (closing): The workers in these shops are pretty well protected. Supervisors are very strict and do not allow any play or joking because, if they do, the men get into trouble. Any man playing around with any machine would be disciplined very severely.

The meeting adjourned.

R. T. LAVAKE, M.D.,
Secretary.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

* * *

ABORTION—SPONTANEOUS AND INDUCED. Medical and Social Aspects. Frederick J. Taussig, M.D., F.A.C.S. Professor of Clinical Obstetrics and Clinical Gynecology, Washington University School of Medicine, Saint Louis. 536 pages. Illus. Price, cloth, \$7.50. St. Louis: C. V. Mosby Co., 1936.

* * *

EXAMINATION OF THE PATIENT AND SYMPTOMATIC DIAGNOSIS. Second Edition. John Watts Murray, M.D. 1219 pages. Illus. Price, cloth, \$10.00. St. Louis: C. V. Mosby & Co., 1936.

* * *

SYNOPSIS OF CLINICAL LABORATORY METHODS. W. E. Bray, B.A., M.D. Professor of Clinical Pathology, University of Virginia; Director of Clinical Laboratories, University of Virginia Hospital. 324 pages. Illus. Price, flexible binding, \$3.75. St. Louis: C. V. Mosby & Co., 1936.

AN INDEX OF DIFFERENTIAL DIAGNOSIS OF MAIN SYMPTOMS. Fifth Edition. Edited by Herbert French, C.V.O., C.B.E., M.A., M.D. (Oxon.), F.R.C.P. (Lond.). Consulting Physician to Guy's Hospital; late physician to H. M. Household. 1145 pages. Illus. Price, cloth, \$16.00. Baltimore: Wm. Wood & Co., 1936.

* * *

CONVALESCENT CARE IN GREAT BRITAIN. Social Service Monographs No. 34. Elizabeth Greene Gardiner, Assistant Professor and Supervisor of Medical Social Work, University of Minnesota. 163 pages. Price, cloth, \$1.50. Chicago: University of Chicago Press, 1935.

DISEASE AND DESTINY. Ralph H. Major, M.D. 338 pages. Illus. \$3.50. New York: Appleton Century Co., 1936.

A highly favored, though seemingly futile practice indulged in by medical historians is that of surmising the course of world events, had not some particular disease or pestilence exerted its influence. In "Disease and Destiny," Ralph H. Major occasionally wanders into the devious realms of second guessing, inevitably with rather fanciful conjectures. For the most part, however, he is content to elucidate only on the direct and unquestionable influence of various diseases upon the course of history, geography, religion, philosophy, and the progress of civilization.

Although in recent years there has been no dearth of books on this same subject, "Disease and Destiny" has a particular charm that makes it rather distinctive. The author has interspersed throughout his book many anecdotes of relatively unimportant events and persons. These are not only intensely interesting purely as stories, but they give a more human and intimate insight into the influence of disease on what our New Deal phraseology might term "the forgotten man" of history.

Of the various diseases discussed, the chapters on syphilis and on the bubonic plague are most engaging. Readers will find this book entertainingly informative.

CHARLES L. STEINBERG, M.D.

EXAMINATION OF THE PATIENTS AND SYMPTOMATIC DIAGNOSIS. John Watts Murray, M.D., 2nd Edition. 1219 pages. Illus. Price, \$10.00. St. Louis: C. V. Mosby Co., 1936.

This is a book of 1219 pages which has gone into a second edition. In his preface the author stresses the indubitable necessity for the taking of a detailed history; he states that he does not claim to present any new facts but to present a large number of old established facts in condensed and helpful form. The subject matter has been gathered from the standard works most widely used in medical schools, various journals and results obtained by experienced medical men. The book is copiously illustrated, largely by reprints from other works. It is well printed and arranged. There is an ample index.